THE

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THE COLLECTION OF FOREIGN TRADE INFORMATION.

TRADE journals which make special efforts to keep their readers acquainted with the state of affairs in overseas countries should be systematically studied by the members of manufacturers' and traders' staffs who are appointed to collect information likely to help in the expansion of export trade. First, it is important to know what publications to include for the purpose of making a useful search; secondly, the study should be made by a representative who has his (or her) wits about him and who has sufficient imagination, either developed or capable of development, to understand the possibilities of his work. But in our view the right papers and the suitable representative are not more essential than is a thoroughly sound method of recording the material to render it available for ready reference by the departments desiring to make practical use of it.

There are several qualities going to stamp a journal as a suitable one to include in such a collection. One with local and circumscribed interests can hardly be expected to have a vision of world affairs and large requirements. The student will not have to peruse many copies of a given publication in order to know whether he can afford to omit it from his list. There are journals whose foreign trade reputation has long been known, so that they go on the list as a matter of course; each number bears the evidence that, as the result of lengthy experience and organisation, the journal's contents and advertisements have gathered about it a multitude of regular readers of the purchasing or specifying classes in various parts of the world. And this reading connection brings to the editors of such journals much interesting matter for which they are always grateful; indeed, few things are more gratifying to those connected with the trade Press than the cordiality of the relationship between themselves and their foreign correspondents. The ELECTRICAL REVIEW is always delighted when its overseas readers address its editors regarding the problems with which they are confronted in connection with their special operations or undertakings—perhaps more of them will take note of this circumstance!

When we know where to find useful information we have to extract and suitably classify and record it. There are big electrical manufacturing concerns which are not content with the mere blue-pencilling of a paragraph or article, leaving a pile of marked journals to accumulate in the hope that they will receive somebody's attention at a convenient season. They make a practice of having everything cut out and pasted on cards for handy reference and classification, perhaps, say, according to country or kind of product. When they contemplate new activities, say, in Australia, in China, or in France or Italy, they know just where to look for all that has been brought together relating to the position of that market and the character of its requirements. Some of the material thus collected has to be used at once while the news is hot—such, for example, as open contracts calling for the obtaining of specifications and the preparation of tenders; other relates to the cost of living or conditions generally which form an approximate guide in arranging for the accommodation of representatives visiting such fields either temporarily bent on preliminary survey work, or for a period of years as an active business cultivating agent, or again as a constructional employé on a particular

contract; other information includes indications of coming large general and electrical development schemes—matters which may be interesting to-morrow or may not be of practical value until next year or the year after. Whenever required, it can be referred to conveniently and profitably if it is brought together suitably.

We commend the importance of this matter to the notice of manufacturers and their staffs who desire to render their foreign trade intelligence service efficient. The trade Press in various cases regards it as one of its special duties and privileges to assist British foreign trade expansion by the collection and publication of information of the class mentioned, and it invites manufacturing and trading concerns to make full use of what it places at their disposal.

A Proposed "Christian Order of Industry."

Some months ago there came to hand in the ordinary course, just as we receive hundreds of other matters for comment, a prospectus of the National Movement towards a Christian Order of Industry and Commerce, which was about to start operations. Its founders were obviously men of lofty ideals and great ambitions who quailed not before the immensity of the task they had set themselves. We ventured to comment upon the scheme generally, primarily with the desire of encouraging readers to study for themselves the proposition that, other things having failed to produce a perfect industrial atmosphere, much less a state or conscience, it was desirable to concentrate upon the application of the cardinal principles of Christianity as the means by which industrial and commercial life might be purified and uplifted. As we have had very lengthy experience as editors, we were not perturbed to find that our comments were very variously received. They excited suspicion from a writer in a labour paper, and we were both amused and surprised at his suggestion that the "F.B.I." as representing Big Business was behind "this latest move" to force the workers back to the conditions of 1908! We were accused by one correspondent of taking up a patronising attitude toward the movement, yet we were heartily thanked by others who were directly interested in the organisation itself! The letters of several correspondents who desired to give an immediately practical turn to the discussion by exposing some of the immoral practices existing in trade, were published in our pages. Inasmuch as it is always our wish that any matter with which we deal should be considered from every standpoint, we welcomed these very diverse views, while we regretted the existence of the totally unjustifiable suspicion referred to because we know how large a factor mutual suspicion has been in preventing the promotion of mutual co-operation. If we return to the subject now, it is because we still feel that the influence of Christian principles in the industries and business affairs of a Christian people ought to be more thoroughly discussed than it is, though, as we indicated earlier in the year, it is our belief that the leavening influence of Christianity is operating in hundreds of unrecognised ways because it is operating freed from the objectionable restrictions and shibboleths of orthodoxy. We hold no brief for any organisation whatsoever in this matter, whether it be called a "National Movement" or whether regard be had to the suspicion of "F.B.I." influence; but our present comments are induced by the receipt of a re-drafted statement that has been issued by the National Movement. We have compared it with the original document, and find that the early enthusiasm has slightly waned. For instance, it has abandoned men and women from "the professions" from its scope and has eliminated "professional" life from the branches to which Christian principles should be applied by the efforts of the Movement! We read this with perplexed thoughts—are we past redemption that we should be cast out? or is it that in our ranks saints predominate? Our peace of mind returns as we proceed to find that whereas formerly the Movement desired "to co-operate with men and women of goodwill in the ranks of labour," it now adds "and in other departments of national life, *e.g.*, the scientific and educational," which means that the professional element in life is really worthy, after all, and is expected to swell the rallying throng of workers, rather than to be cast out. How interesting must have been the discussions that led to this re-drafting! There are other additions and emendations which indicate that great latitude must be shown by the movement, inasmuch as "Christian ideals may find expression in widely differing types of industrial polity." There are important contractions of aims which unquestionably were too widely stated in the days of early enthusiasm. It is no longer felt that the Movement can set up a Central Inquiry and Information Bureau, or undertake to advise professionally upon schemes for the applications of Christian principles into modern business, or let its voice be heard in the land influencing legislation toward the end for which it is formed. These changes are all for the better. An ideal is of little value unless it be backed with enthusiasm, but enthusiasm may beget an exaggerated idea of what is reasonably attainable and may overlook the fact that Christian principles can never be imposed by Act of Parliament unless the race be Christian first—and then legislation might be unnecessary. During the war the lack of spiritual ideals was generally blamed as the cause of perverted ambitions which brought about the downfall of Prussian militarism. Our own nation recognised the greater need for such ideals here, and that need was expressed by many who are now silent on the point. When the devil was sick the devil a monk would be, &c. But we have said enough to stimulate interest in the restatement issued by the Movement, and our readers can, if they so desire, obtain copies of the literature from the Secretary at 24, Great Russell Street, London, W.C.1.

X-ray Protection.

In view of the fact that there is little doubt that the majority of the X-ray installations in this country are deficient from the point of view of safety, and that the conditions under which radium workers have to carry out their duties are often calculated ultimately to lead to detrimental effects on the operators, it is not surprising that the degree of protection offered by the so-called protective appliances used by X-ray and radium workers has excited considerable public attention and anxiety recently.

The subject is of special importance, because the early manifestation of visible injuries to the superficial tissues, which may result in permanent damage, or the derangement of internal organs and changes in the blood, which result from over exposure, is often unrecognised. Moreover, in view of the varying susceptibilities of workers to radiation, even periodic tests upon the blood of the personnel made in order to facilitate the recognition at any early stage of any changes which may occur therein do not always meet with success, inasmuch as in the present state of knowledge it is difficult to decide when small variations from the normal blood-count become significant. It is thus possible for serious damage to be caused to the worker before the presence of any delitescent effects is even suspected.

It is agreed, however, that the danger of over-exposure to X-rays and radium emanation can be avoided by the provision of efficient protective measures and suitable working conditions, and it is reassuring to note that the recommendations contained in the X-ray and Radium Protection Committee's preliminary report, the contents of which are referred to in some detail elsewhere in this issue, are being widely acted upon, and the decision of the National Physical Laboratory to advise on, and undertake the inspection of, X-ray installations on request is welcomed as being another step in the right direction. Similar inspection facilities are provided by the N.P.L. for radium workers, and a number of hospitals have already availed themselves of them.

Nevertheless, while it is the duty of those in charge of X-ray and radium departments to ensure efficient protection and suitable working conditions for the personnel, and although it is believed that an adequate degree of safety would result if the recommendations put forward by the Committee were acted upon, it must be emphasised that everything entirely depends upon the loyal co-operation of the workers themselves in following strictly and intelligently the precautionary measures outlined for their benefit.

The F.B.I. and Allied Debts.

Among the many questions which have engaged or which are engaging the attention of the Federation of British Industries, that of allied private claims for compensation against Germany and the problem of inter-Allied debts occupy a very prominent position. In the former case the question arose as a result of a recent application made by Germany for a reduction from £2,000,000 to £500,000 sterling in the amount of the monthly payment to the Allies Offices of Compensation (Debt Offices), which was fixed by the agreement of June 10th, 1921. The Federation addressed a letter to the Board of Trade, asking that instructions might be given to the British representative on the Reparations Commission not to accede to the German request, as a reduction in the amount of the instalment would result in further delays beyond those already occurring in the settlement of claims for compensation by British firms. When the representatives of the Allied Debt Offices investigated the application last week, they reached the conclusion and expressed the unanimous opinion that Germany should continue to pay her fixed monthly instalment owing to the bad faith shown by the German Government in the matter of Allied debts in Germany. As a consequence of this unanimity, M. Poincaré at once informed the German Ambassador in Paris, who signed the request for a reduction in the amount of the instalment, that the payments must be maintained at two millions sterling per month.

It will be seen that the wish of the Federation has been fulfilled in one respect, but its attitude on the much larger question of inter-Allied debts raises some very delicate points. When the Grand Council of the Federation met on July 19th, an impressive speech was delivered by Colonel O. C. Armstrong, president, in the course of which he stated that if Great Britain, as had been suggested in certain quarters, should entirely remit the debts owing to her by her Allies, Great Britain should look for some return in the direction of the breakdown of the tariff walls which are being raised against us by other countries. In the result the Grand Council decided to send a letter to the Prime Minister in the sense suggested by the president.

The letter points out that excluding Russia, other countries owe Great Britain approximately £1,100,000,000, representing an annual charge of £70,000,000 for interest and sinking fund; but the debtor countries are as yet not providing for either of these charges. On the other hand, Great Britain owes £998,000,000 to the United States as a consequence of having used British credit for the benefit of these debtor countries, and on this debt interest at the rate of £50,000,000 per annum is already being paid, and an additional annual charge for capital repayment must be anticipated in the near future. What this means is that the British taxpayer is shouldering a burden equal to over 1s. in the pound on the income tax, which may rise to 1s. 6d. as soon as sinking fund payments begin, in order to relieve the taxpayers of the debtor countries from a liability which they cannot meet at present.

On the other hand, the Federation states that British industry, upon which the chief burden of this taxation falls, is experiencing the most severe depression in the history of the country, accompanied by an unprecedented rate of unemployment. But the debtor countries, which are less heavily taxed than Great Britain and comparatively free from unemployment, have erected and are erecting formidable tariff barriers against the entry of British goods. At the same time, the industries of these particular countries, benefiting by a lower rate of taxation, and temporarily at least by the depreciation of their currencies, are becoming increasingly serious competitors of British industry in the remaining export markets.

It is under these circumstances that the Federation is opposed to permanent cancellation of the debts owing to Great Britain, as such cancellation would not only represent the throwing away of our principal weapon for bargaining in any future settlement, but we should also run the risk that such a settlement might never be made. In conclusion, the Federation expresses the hope that the Government will make no further surrender of British rights except in return for immediate counter-concessions of definite and substantial economic value.

South African Fields.

If only on account of the large programme of railway development which it has now been definitely decided to put in hand in South Africa, that country offers great attractions to the engineering exporter. For the electrification work which has so far been put to tender, satisfactory orders have been secured for this country in the face of American competition. Before the war, it will be recalled, there was a tendency here and there in the Union to install power plant offered at low prices by our foreign competitors. This course apparently has effected no economy in the long run, and purchasers are once more showing active recognition of the fact that in reliability and cheapness in operation, British machinery has no equal. Last year the value of manufacturing machinery imported amounted to £1,514,000, the highest total ever recorded. Of it, the United Kingdom supplied £1,119,000 worth. Some details of the various headings were given recently in our news columns.

These reflections are prompted by the perusal of Mr. C. W. Francis Harrison's admirably produced and illustrated review of the trade, industries and productions of British South Africa. It is a revised edition of his 1919 report to the Federation of British Industries. Mr. Harrison sees a widening outlet for British manufactures in connection with the growth in divers directions of the Union's industries, new and old. His view may at first sight seem distorted, but it must be borne in mind that in the fostering of the new industries, plant, equipment and semi-manufactured material will be required, and that their successful progress means a general advance in the economic state of the Union and in its purchasing power. If the country builds up a number of prosperous industries, it will acquire a more stable position than if dependent on one alone, even such an industry as gold production. It is to be hoped that Mr. Harrison will prove a true prophet in foretelling a bright outlook again for the mining industry. The prospect lends interest to the detailed tables he gives of the quantities and values of all the various stores, including electrical and other machinery purchased by the mines. A warning is added that British firms should economise in their sales organisations because the mining houses feel that they are paying too much in commissions. On the subject of representation, he says, there is universal agreement as to the desirability of technical specialists visiting oversea markets in order to study the trade in their own particular lines and glean first-hand information as to what is required. A very important function these specialists could perform would be the investigation of what new demands could be created. Mr. Harrison adds that they could also inquire into the necessity for firms to amalgamate their manufacturing interests in order more effectively to serve oversea markets. The advisability of arranging combined selling organisations has been advocated by us again and again in these columns.

FALSE MARKING AND DESCRIPTION OF GOODS WITH SPECIAL REFERENCE TO ORIGIN.

By THEODORE RICH.

Part I.—Do the Profits Justify the Means?

There is a saying that "all is fair in love and war," but to-day, owing perhaps largely to what might be termed international commercialism, there seems to be almost a convention in some quarters that all is fair in commerce, and that in order to sell goods any deception or humbug is legitimate. The commercial conscience is being seared with the hot iron of "business acumen," and actions which years ago would have been called deliberate fraud, are now often condoned with the remark that the public likes to be defrauded, and therefore deserves to be so. While "friends of the people" have been offering glittering prizes in the way of political social reform, it has been too often forgotten that many boasted improvements have been accompanied by a lowered commercial morality; those who become rich are considered to be *ipso-facto* respectable regardless of the way in which they have made their money; real progress or reform does not stop at the door-mat of the counting-house: it must go through and through business transactions.

There is an old saying, "He that pays the piper calls the tune"; in accordance with the same principle, the man who makes purchases has a right to know who he is dealing with, where the goods come from, and what the quality or description is. Many firms, places, and countries have from time to time earned reputations for goods they manufacture, and vendors, whether direct or indirect, have no right to deceive the customer, directly or passively, into the idea that he is buying something that he is not. It is a fraud on the purchaser, and it is from the point of view of common morality a sort of theft from the people from whom the customer thinks that the things have come.

A customer chooses a particular butcher or baker to deal with, because he thinks he will then get good value and a square deal, and even when prices are equal he may prefer to put the business through a particular tradesman because he likes him and he wants to help him on. A purchaser has the same right of preference regarding the origin of the goods he buys; if a man has prejudices, that is no reason why he should be swindled.

"Caveat Emptor."

A vast amount of dishonesty has been cloaked under the legal maxim, *Caveat emptor*: let the buyer beware. This is all very well when the buyer and seller are both experts, but in most classes of trade the buyer has, to a material extent, to rely on the honesty of the seller, the matter being rendered much more important owing to the very much greater variety of goods brought within the reach of the working classes by the increased exchange value of labour resulting from inventions and improvements in co-ordinated manufacture and transport.

After a great war, when many people have made sacrifices and suffered terrible losses, there are naturally many men and women who do not wish to deal with their late enemies, at any rate on a par with their countrymen or their war allies; and although this feeling may be sneered at by those who made hay while the blood flowed, it is a legitimate feeling. While to deceive such people may be fashionable in some circles, yet it is cruelly unfair to the best of the nation, and should, if right were right, be punished with the utmost rigour of the law.

It is very difficult to deal with a subject such as the false marking and description of goods without going somewhat into the history of the question, and while it is possible to deal with the law as it stands and certain legal decisions alone, such an examination is of very little use unless the practical difficulties connected with the application of the law are explained, and these can only be handled when economic, political, and other factors are taken into consideration. It is difficult to entirely separate trade marks from other questions, and therefore they will be touched upon from time to time.

Blue Books.

A considerable part of the matter in this series of articles has been based on the minutes of evidence of different Parliamentary Committees which have inquired into the marking of goods and produce from 1893 to the present day. The following are among the reports of interest:—

House of Commons.—Report on the Merchandise Marks Act of 1887. 1890. 360 pages. Price 3s.

House of Lords.—House of Lords' Second Report on the Marking of Foreign and Colonial Produce, 1894. 83 pages. Price 11d.

Report on the Marking of Foreign Meat, &c., 1893. 220 pages. Price 3s. 1½d.

Board of Trade.—Merchandise Marks Committee, Minutes of Evidence. Published August, 1920. 272 pages. Price 30s.

Report on same. Published July, 1920. 16 pages. Price 2d.

By examination of the blue books it is possible to note the gradual change in mentality which has taken place during the last 30 years, not merely in commercial circles, but also among Government officials, whose actions and ideas tend to follow the wishes of their Parliamentary superiors.

It is interesting to note that the cost of printing has gone up ten times from 1890 to 1920.

The prohibitive cost of recent Government publications tends to shut out from the public the very information that Government Committees are formed to bring out. If the Government decides to publish evidence or other information in the form of blue books for the information of the public, the cost of setting-up should be a charge on the State, and the only cost to those who want to obtain the information should be that of paper and machining. To charge 30s. for minutes of a committee whose findings may affect every manufacturer and trader in the country, is to cut off a vital source of national education, to publish in theory and to suppress in fact. The object of a Government Committee is to elucidate facts, promote discussion, and encourage reforms where necessary. Recently the sum of 15s. was charged for a short report on the railless trolley system.

In the 1919-1920 Committee, members of the Committee itself were allowed to give evidence, a procedure more modern than honest; a man should not be put in a position where he might be plaintiff, witness, judge and jury of his own case. This procedure was brought into notoriety during the 1919 Coal Commission; it tends towards the selection of members by professional politicians in order to obtain the findings desired.

Change in National Outlook.

The evidence of the 1890 Committee is worthy of study, because at that time our industry, commerce, and finance were to a very material extent British in character and not merely in name, and ample evidence could then be seen of that common honesty and sterling character which did so much to build up the nation.

When one comes to study the minutes of the 1919-1920

inquiry, one is forced to the conclusion that ideas of commercial morality and public duty have undergone a change for the worse.

The idea that the profit justifies the means may be all very well to some people; a public that is being fooled, which notes that all kinds of trickery are condoned, which is told that, provided there is profit in it, we should trade with Krassin and Trotsky, begins to react and condone "free fraud." Those who ridicule the efforts of the old trade guilds in the past to keep down bad workmanship, imitation, and fraud, are the same class of persons who come to give evidence, proclaiming, in effect, that the purchaser deserves to be fooled—that he has no right to know what he is buying and where it came from.

"What they call Patriotism."

At the 1919-1920 inquiry a representative of a number of concerns, controlled largely by multi-millionaires and specialists in mergers, who opposed the idea of an Empire Trade Mark, crystallised, in paragraph 4,938, the commercial mentality of the day into a few words:—

"*Question*: As a general inference, Sir John Cockburn (who was interested in the question of 'national' and 'community' marks) is taking the patriotic view that British goods are better than those of the rest of the world? *Answer*: That is the *inherent vice* of this application; that is prompted more *by what they call patriotism* than by sound business sense.

Question: We have had an immense amount of evidence that it is to the interests of a very great number of people to infringe British get-ups and trade marks? *Answer*: Yes."

Experience in the war has shown that it is of importance, from a strategic point of view, that a country should be as far as practicable self-contained. Germany could not have kept going 12 months if it had not been for the remarkable system by which the production of food and manufactures could go on simultaneously. Between 1914 and 1918 France found herself as a manufacturing nation.

After the war a number of patriotic French manufacturers banded themselves together to encourage co-operative national production and to that end got out a trade mark "Unis," "a mark of origin on the one hand; on the other hand it is a mark of quality" (paragraph 5,143).

A number of British firms, some of them concerns whose names are household words, persuaded perhaps by influences which came so often to a head before and since the war when matters of real value to the Entente Cordiale were proposed, opposed the use of this mark in the United Kingdom, and recently spent many hundreds of pounds in law costs to try and prevent our former comrades in arms from obtaining reasonable facilities in our Courts of Law, by registration under the Trade Marks Acts, in order toprevent fraud.

Friends of Free Fraud.

During the last 30 years evidence at official inquiries on matters from frozen beef to plated forks, seems to show, whether on the part of retailers, wholesalers, import merchants, shippers or transhippers, that those who oppose the honest marking or description of goods or produce are those who passively allow the intermediate or ultimate purchaser to be deceived, because by doing so they make more money. Provided extra profits are made, it is reactionary to ask inconvenient questions. The way in which friends of self-deception by customers wriggle when under cross-examination by friends of honest trading, is a most interesting feature of several inquiries, and one must say regarding many dealers that "*qui s'excuse s'accuse*." Some of the arguments used by some of those who admit that they have been large importers and dealers in German goods give an indication of where their sympathies lie.

German Competition: its Inception.

Years ago British manufacturers had a very high character for integrity, and although the British workman was, so we are told by gushing sociologists, in the depths of degradation, he nevertheless turned out about the best work in the world at the fastest rate. It came about, therefore, that British goods found their way into all parts of the world, and enjoyed and deserved a very high reputation.

In the second half of the last century, when after a series of wars the European boundaries were settled and the wave of organised communism began to die down, great efforts were made to build up manufacturing interests or operations in Central Europe, especially in Germany.

Bismarck realised that to obtain success as a world power the sword was useless unless backed by a solid structure of industry, and he therefore called in, to aid him in his programme, the manufacturer, the merchant, and the financier. Wherever the German commercial traveller went he found British goods supreme, with a high reputation, and therefore it was decided to imitate the Machiavellian methods of Frederick the Great to gain the ends desired by peaceful penetration and trickery. Numbers of financial and commercial men were sent over to worm their way into our business community, with instructions to take an enthusiastic interest in industrial politics. Men of the Karl Marx type were financed and encouraged to beat up industrial trouble; swarms of German clerks came over to act as foreign correspondents at low wages, and their services were accepted by those who could not see many inches in front of their noses, and week in week out the theory was preached that immediate profit was the main thing, leaving the future to take care of itself.

Scores of men, backed by Mid-European finance, set up in business in London and in the big manufacturing centres, obtaining the rights of citizenship at the earliest possible moment whilst buying certain quantities of British goods to send abroad and to sell at home. As soon as they got a footing, samples of local productions were sent to their brothers and cousins in the Fatherland, and imitation British goods, got up, packed and labelled to look like local productions, were sent into the markets where British goods went.

Taking advantage of British easy-going tolerance, scores of men of German origin changed their names or floated companies with a British or local flavour about them, thus heightening the illusion. According to evidence given before the 1920 Marks Committee, paragraph 3,675, the Sheffield Chamber of Commerce "submitted that legislation ought to be passed to enable a city or town celebrated for the manufacture of some particular goods, to have some jurisdiction over the assumption of the name of that city or town in the titles of limited companies or firms or other trading concerns. A small trader often selects the highest sounding name. . . ." In Sheffield several companies have been registered in recent years in which "Sheffield" is put first in such a way as to lead to the belief that the concern is one of immense local importance; *e.g.*, Sheffield Steel Makers, Limited—a concern formed by a German. It failed, and all the chief Sheffield steel manufacturers bought the goodwill from the liquidator to get the title into their own hands.

At the 1890 inquiry, paragraphs 1,377 to 1,381, a witness from the Sheffield Federated Trades Council said: "Foreigners come and take up positions among us as factors, and also manufacture goods in Sheffield, have large consignments of foreign-made goods come to their warehouse in Sheffield; they send them out without distinction; the invoice bears the word 'Sheffield'; the goods are blank. . . If you are a South American importer, that is to say, you receive so many gross of knives from Sheffield, and you believe them all to be Sheffield make."

We therefore got the following state of affairs:—A foreign or home buyer hearing of some firm with a British-sounding name in some centre, such as Nottingham, Birmingham, or Manchester, celebrated for some class of goods, forwards an order; British goods mixed

up with German, or German goods only, are supplied, which the retailer quite innocently sells as goods of the locality in question.

There is a further incentive to false marking. It was pointed out in 1890, paragraphs 3,731-6, that there were firms of foreign origin in Sheffield which even at equal prices gave preference to their foreign allies, a matter of importance when the purchaser did not know he was buying a foreign article.

In the 1890 inquiry (paragraphs 4,062 to 4,068) it was pointed out that in some trades "There is nothing new which comes out in France and England but which is copied in Germany." "They imitate everything, . . . the goods, . . . the marks" (paragraph 3,660). "The greatest offenders are the Germans." The crux of the matter was that people were willing to pay a better price for British goods than for German; therefore it paid to sell one as the other.

Although the above extracts are mostly taken from the 1890 inquiry, the practices complained of had gone on for years. Manufacturers got alarmed at the way their designs were being copied, and they were being robbed of trade they had built up legitimately, and the result was the Merchandise Marks Act of 1887.

The question of the revision of this Act is now under discussion in Parliament.

ELECTRICAL ENGINEERING AT THE LIÉGE EXHIBITION.

By W. POLYDOROFF, A.M.I.E.E.

One must be well acquainted with Belgium to be able to appreciate the efforts of the Society of Engineers of this industrious little country in the organisation of such a wonderful exhibition of technical developments and various Belgian products.

Liége, being considered as the Belgian industrial centre, was chosen as a suitable place for the exhibition. Three magnificent palaces, and a number of small kiosks in which provision is made for different firms to exhibit their productions, are situated on the right bank of the river Meuse, in the grounds of the beautiful park of Boverie.

It would take too much space to describe all the exhibits; I shall therefore only mention some interesting improvements in electrical engineering. Electrical machinery is a much developed branch in Belgium, and is well represented at this exhibition. Many new types of dynamos, motors, &c., are shown. The Société d'Electricité et Mécanique exhibits new types of large and small d.c. motors which, being strong, simple, and waterproof, are suitable for use in collieries; there is also a variable transformer with a ratio of transformation of 1 to 300, which is a very useful apparatus for laboratory testing or experimental work.

An entirely new and very remarkable type of rotary converter is built by the Constructions Electriques de Belgique. The rotor is of squirrel-cage type, and the machine is self-starting and self-synchronising. The simplicity of handling by means of a special controller makes this machine still more convenient. I was told that this rotary converter was the second machine of its kind, the first one having passed through many successful trials. The designer claims for it very high efficiency.

The Ateliers de Constructions Electriques de Charleroi shows various heavy enclosed machines. The firm has developed very reliable high-pressure switchgear and other h.p. apparatus.

Oil circuit breakers and switches of high capacity for high pressure are the speciality of Soc. Anon. Jean Labouverie, and are very well designed for great durability. The same firm exhibits the Fuss automatic voltage regulator, which is a small, inexpensive, and reliable instrument based on a new principle; it is used all over Belgium, but is almost unknown in England.

Messrs. Brown, Boveri exhibit their well-known high-power mercury rectifier (220 volts, 910 amp.). Their engineer told me that the firm had recently solved the problem of transformation from high pressure to low pressure with the high efficiency of 97-99 per cent. by means of the mercury arc. They had also succeeded in obtaining a.c. from a d.c. source with the aid of their apparatus. The firm exhibits models of its electric locomotives of 1,750 h.p. for Swiss railways; the Oerlikon Co. has made great progress in this direction, and shows 2,300 h.p.

The Heyland type 3-phase commutator motor is made by the Comptoir Franco-Belge d'Electricité; it is a small motor for common use, easily regulated by moving the brushes.

It is worthy of note that nickel-iron (alkali) accumulators are now in common use in Belgium, and replace the ordinary sulphuric-acid ones. I saw the new type of Jungner battery, which was as big as the Tudor. All the new miners' lamps are fitted with nickel-iron cells, and there is very little difference in cost.

Wireless telegraphy is well represented by the Société Indépendant Belge de la T.S.F., which has acquired various French patents in Belgium. The S.I.B. has its own reception room, with a single aerial. It was only by means of a special pass from the Society that I could get into the reception room—so large was the crowd of people awaiting their turn to listen to the wireless mysteries. The Society has taken advantage of the great public interest in wireless, and besides developing its famous French apparatus, has produced an amateur's set called "Radio-puzzle." This set is very nicely finished, and is offered at a reasonable price, so that the amateur buying set No. 1 is easily tempted to buy Nos. 2, 3, &c.

I am afraid it would increase the rush of British visitors to Belgium if I were to tell them that a really good French valve only costs 7s. there, and every amateur can afford to use several valves.

I must mention the magnificent scheme for the exploitation of the water power of Belgium (River Meuse) expounded by a group of leading engineers of the country. It has been calculated that the exploitation would give 1,830 million kWh per annum, thus effecting a saving of three million tons of coal, equivalent to 400,000,000 francs per annum. The complete scheme would cost about 5 milliards of francs, representing 2 per cent. of the annual budget of the country during 25 years. The outlay necessary to bring the river into a navigable state through the country is included in the scheme.

It is an audacious and wonderful enterprise, and I am sure it will be sooner or later carried out either by the State or by a private company. It is enough to visit once this assiduous country to understand its capacity for enterprise throughout the whole world.

The Rubber Industry.—On July 26th Lord Colwyn opened the new laboratories of the Research Association of British Rubber & Tyre Manufacturers at Croydon. The premises comprise offices, a library, experimental and test laboratories, and a rubber factory in miniature. Mr. Alexander Johnston (North British Rubber Co.), who presided, said that rubber entered into every branch of industry, making the manufacture of rubber an important process. He was confident that prosperity would soon be restored to both the production and manufacturing branches. Lord Colwyn said that Germany was a keen competitor, for whereas she had money to develop her industries, British enterprise was handicapped by excessive taxation. The rubber industry was in a bad position, and he hoped that America would not be in a position to buy up properties at the present low prices. On the same day, at the annual meeting of the Bukit Mertajam Rubber Co., Ltd., the chairman (Mr. A. G. Angier) said that restricted production and rigid economy were in force—the estate was only producing half of the possible quantity, thus conserving the bark against better times. The loss for the year was £2,900, as against £9,460 in the previous year.

THE ELECTRICAL EQUIPMENT OF THE LONDON COUNTY HALL.

Formed by Act of Parliament in 1889, the London County Council was charged with the administration of an area of 117 square miles, which contained a population of 4½ millions—as many souls as Australia or Canada at that date. Yet, in spite of the dignity and importance of the Council, it was not until 1905 that active steps were taken to house it and its growing staff in a building worthy of the purpose. In the following year a site was acquired on the south side of the river, opposite the Victoria Embankment, and as the result of an open competition, a design submitted by Mr. Ralph Knott was adopted, the author being subsequently appointed architect for the building in association with Mr. W. E. Riley, the official architect to the Council.

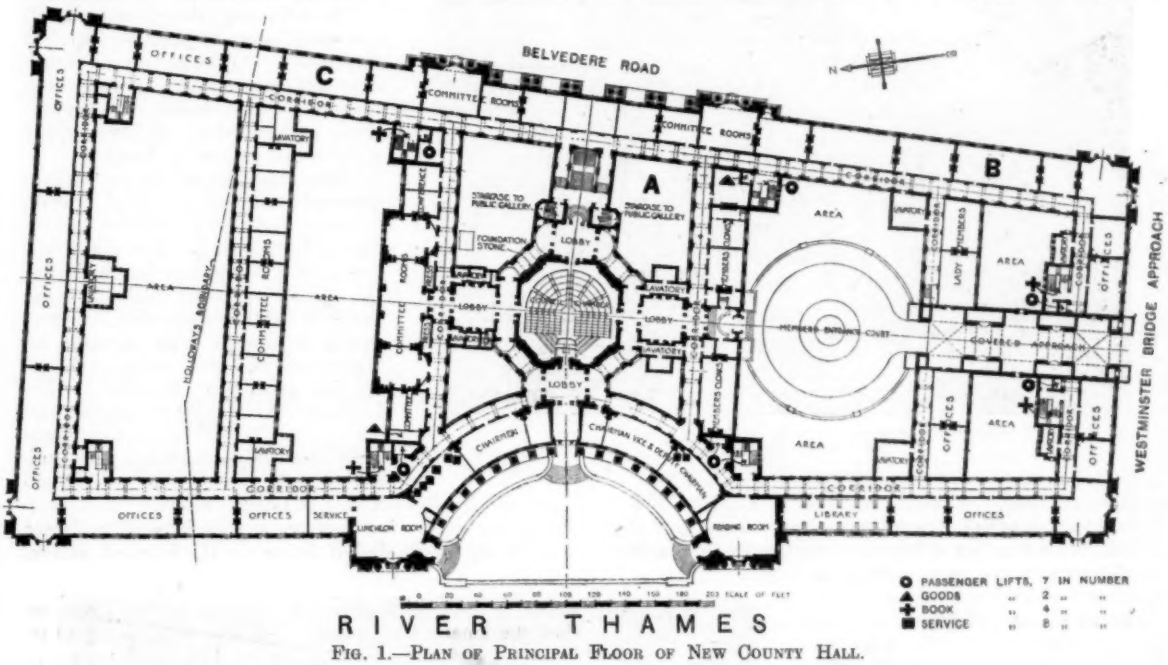

Fig. 1.—Plan of Principal Floor of New County Hall.

The area of the Westminster Bridge site, including some 2½ acres reclaimed from the river, is about 6½ acres, and the building, when completed, will be 750 ft. long, with an average width of more than 300 ft. It will be appreciated, therefore, that the County Hall is one of the largest structures in the country; it has already cost 3½ millions sterling, and the total cost, when the remaining section is completed, will be over 4 millions. The building comprises 9 storeys, the lowest two of which are below ground level, and will be used mainly for storage purposes. The whole of the site is covered with a concrete raft 5 ft. thick, surrounded by retaining walls; a plan of the principal floor is reproduced in fig. 1. The contractors for the superstructure were Messrs. Holland, Hannen & Cubitts, Ltd., whose tender was accepted in March, 1913; it was hoped that the building would be completed during 1916, but the outbreak of war seriously delayed the work, which in fact was brought to a standstill early in 1916, the habitable part of the building being occupied by the Ministry of Food and H.M. Office of Works until 1919. In that year work was resumed, and on July 17th, 1922, the County Hall was formally opened by the King, who had laid the foundation stone in 1912.

The whole of the building work has been carried out in accordance with the highest standards of material and workmanship. The Council Chamber, fig. 2, which accommodates 200 members, is octagonal in plan, is 55 ft. in height, and is lined with marble and oak panelling of great beauty, and the committee rooms, lobbies, and main staircase, fig. 3, of the principal floor are decorated in similar fashion. Great attention has been given to the heating and ventilation of the building, especially with regard to the Council Chamber, which is supplied with filtered air cooled or heated according to the season, and maintained constantly at a temperature of 65 deg. F. by automatic apparatus controlled by thermostats. The electrical equipment of the building, which comprises lighting, lifts, protection against lightning, telephones and electric clocks, bells

Fig. 2.—Council Chamber.

and annunciators, and power for various purposes, is naturally very extensive and elaborate.

The installation generally has been carried out by the

Fig. 3.—Main Staircase.

builders, Messrs. Holland, Hannen & Cubitts, Ltd., through whom sub-contracts were entered into with the various firms mentioned below. It represents thoroughly up-to-date practice in the electrical equipment of an important building.

Electricity is supplied by the London Electric Supply Corporation, at a pressure of 10,000 volts, single-phase, 85 cycles, to a 750-kW transformer sub-station in the basement under the spot marked A in fig. 1; the e.h.p. switchgear and transformers, which are not yet in position, will be supplied by the British Thomson-Houston Co., Ltd. The transformed energy from this source will be the main lighting supply; it is carried to three separate main switchboards in the basement under the positions marked A, B, C, in fig. 1, whence it is distributed throughout the building at pressures of 420 and 210 volts on the 3-wire system. A stand-by 75-kW d.c. lighting supply is furnished by the Westminster Electric Supply Corporation at 400 and 200 volts, and is distributed from three switchboards located adjacent to the three mentioned above. Fig. 4 illustrates the lighting switchboards in, and fig. 5 is a plan of, the principal distributing centre at A in fig. 1.

In this connection Messrs. Crompton & Co., Ltd., are supplying a booster set that will consist of three machines; the motor will be fed by the 460-volt incoming supply, and it will drive two boosters in the outers of the stand-by supply. Each machine will give a boost of 10 volts at light load and 15 volts at the full load of 70 kW. Messrs. Allen West & Co., Ltd., are making the control panel for the booster set, which will, in conjunction with a current relay, start the machine or stop it automatically as the case may be when the demand on the stand-by circuit reaches or falls below predetermined points, which are adjustable. Every contactor switch will be interlocked to ensure the proper sequence of operation, and a further interlock is to be provided so that in the event of an overload or failure of the supply, the motor will stop and the lighting circuits will be connected direct to their own supply mains; provision is also to be made for switching in the set by hand, if required.

The d.c. 3-wire power supply is furnished by the London Electric Supply Corporation, and from the two main switchboards it will be fed to all motors above 3 h.p. at 460 volts and to machines below that size at 230 volts. The use of the 3-wire system throughout instead of the 2-wire system has resulted in a saving of copper to the value of £8,000.

Switchgear.—Messrs. Dorman and Smith, Ltd., supplied practically all the switchgear at present installed throughout the building. Simplicity and accessibility are leading features of its design, the connections being mainly of bare copper strip or rod carried on insulators.

There are eight main switchboards in all, and a total of close on 60 sub-distribution boards located about the building. The main and stand-by lighting boards are similar in character, consisting of black enamelled slate panels with the insulation reinforced with micanite all supported on steel framework extending from floor to ceiling. The bus-bars are rigidly supported and clamped on to the back of the framework, porcelain insulation being employed; the bus-bars as a whole are protected by fire-proof insulating screens, and deep insulating safety barriers are placed between adjacent panels, the whole design being on the lines of safety.

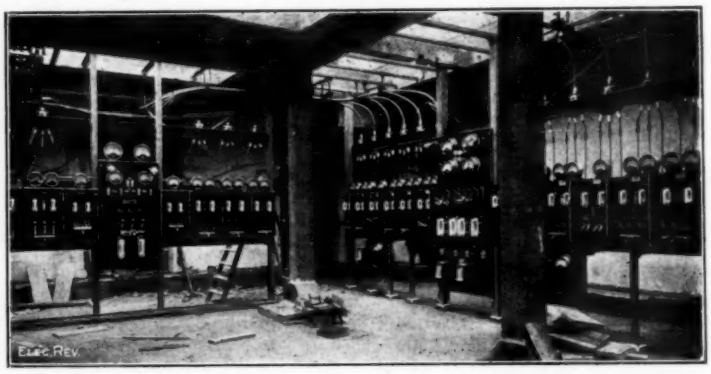

Fig. 4.—Lighting Switchboards.

One main lighting board provides for two 250-amp. incoming feeders, 10 100-amp. single-throw outgoing feeders, and two 100-amp. change-over balancing feeders. The second main lighting board is similar, except that the number of outgoing circuits is less. The third main lighting board controls a 500-amp. incoming, 12 100-amp. single-throw outgoing feeders, and three change-over balancing feeders. One stand-by lighting board provides for one 300-amp. incoming feeder, five 100-amp. single-throw outgoing feeders, and two 30-amp. change-over balancing feeders. The second and third stand-by lighting boards each control one 100-amp. incoming feeder, two 100-amp. single-throw outgoing feeders, and two change-over balancing panels of 30 and 50 amps. respectively. On each panel are mounted instruments, with switches, fuses, and neutral links, and in the case of the main lighting boards, provision is also made for recording the current carried by any feeder by means of graphic recording instruments of the continuous chart pattern, which are mounted on portable panels with flexible connections. All the instruments were provided by Messrs. Everett, Edgcumbe & Co. From the switchboards the incoming and outgoing cables pass upwards to sealing boxes mounted on the framework immediately above the respective panels. The

two main power switchboards are of the totally-enclosed unit patern and completely ironclad; the incoming and outgoing cables pass through self-contained sealing boxes to the units containing the switches, fuses, links, bus-bars, &c. Cast-iron boxes with hinged lids having machined facings are used throughout, and safety interlocks are provided in the case of the switches to prevent access to the apparatus while "alive." The bus-bars are fully ironclad and enclosed, and the complete gear is supported on massive framework cemented into the floor and ceiling. Barriers are placed between metal work of opposite polarity, and locking up provision is made in all cases, so as to prevent access by unauthorised persons. One main power board controls one 500-amp. incoming feeder, six 200, one 100, and three 50-amp. outgoing circuits, and the

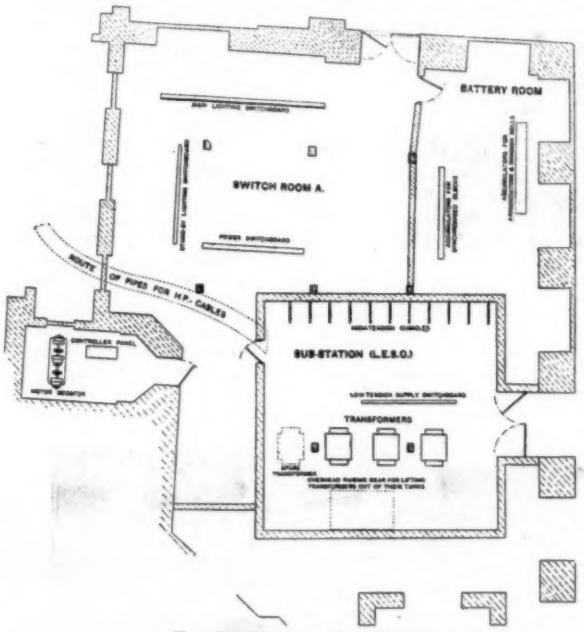

Fig. 5.—Plan of Sub-station.

other main power board controls a 300-amp. incoming circuit, one 200, one 100, three 50-amp., and one 15-amp. outgoing circuits.

The sub-distribution boards are of the ironclad totally-enclosed pattern, those for the general power circuits having separate compartments for opposite polarities, with double lids and safety interlocks, so as to prevent access to both poles at the same time; locking provision is also made to prevent unauthorised interference. As in the case of the main power boards, the joints between the lids and boxes have machined facings, and screwed conduit is used for the cables. There are a number of distribution fuse boxes of the ironclad pattern for the ventilation plant, while the lighting distribution is effected throughout the building by means of Dorman & Smith standard porcelain "Factory Thumb" and "Factory Damper" fuses, with bus-bars and terminal blocks embedded in porcelain bases and mounted at the various distribution centres. The type of fuse used for the smaller currents has been standardised throughout the building; similarly for larger currents the firm's "Handle" fuses have been standardised, and all the switches are of the Dorman & Smith standard d.p. "C" pattern. The standardisation of the equipment in this manner permits of full interchangeability, and at the same time reduces very considerably the number of spare parts that needs to be kept in stock.

(To be concluded.)

Wireless on the Stage.—A feature of a forthcoming London revue is to be a wireless number, in which genuine Marconi apparatus will form part of the stage "props."

SOME SIDELIGHTS ON ELECTRICAL PUBLICITY.

By "VOLTMAN."

It might be thought by many that in these times when the influence of the Press amongst the great mass of the public in general is universally recognised, and the wonders and advantages of electricity as applied to everyday life are so widely extolled in the newspapers, there could be very few of the middle-class public who knew little or nothing of the aforesaid advantages and conveniences of electricity readily available if they only chose to utilise them. It is nevertheless a patent fact that a large section of the middle-class public has but a very hazy idea of the many conveniences, and the amount of time and labour that can be saved by an intelligent use of electricity in the household. There is undoubtedly a great deal of electrical publicity practised, much of it clever and original, but in the writer's experience at any rate this publicity and propaganda makes very little impression on the important class of the public in question. There are so many people who have the rooted idea that the electricity laid on to their houses is limited in its usefulness to lighting. Most of the publicity they see every day deals with lighting, and, generally speaking, they use electric light, and that is the sum total of their interest in domestic electricity.

The writer contends that if this section of the public could be impressed with the wide possibilities of electrical applications in their own homes it would be all to the good and prosperity of the industry. The fact must be kept in view that there is a great want of imagination and enterprise in many people. Electricity is a "mystery" to them. Anything beyond switching on a light requires "expert knowledge" when it comes to handling electricity, so they think!

Here is an instance that came under the writer's observation a little while ago. A lady who uses a hand-driven sewing machine very largely had never heard of such a thing as a small-power electric motor that could be run from an ordinary lampholder. The writer explained that this very diminutive motor could without much difficulty or expense be attached to the sewing machine and vastly increase its usefulness and convenience. The lady was so struck with the idea that she decided then and there to have this useful electrical application. Obviously, this will be good publicity, as this—to her—novel idea will so impress her friends that they will want an electric drive for their sewing machines.

Take the case of small electric fans. There are thousands of homes wherein a small fan would be a much-appreciated accessory. Yet how many people ever think of buying one? They do not seem to know that they can easily tap off the current for the fan from any ordinary lampholder. True, they may see a fan working in a shop window or at an ideal home exhibition, but that does not necessarily impress them that it is something they can readily utilise in their own home: they think that special arrangements are necessary, and possibly expert handling!

Another instance: a City man of considerable means known to the writer, and a man who is generally "*au fait*" as to novel and useful appliances, was totally unaware that there was such a thing as an electric cigar and pipe-lighter that can be worked off any house supply. Being a "devotee of the weed" he has quite a collection of petrol lighters, but now that he has seen how much safer, cleaner, and more convenient the electric lighter is he is delighted with it, and has bought several to use throughout the house. This, again, means good publicity in proportion to the number of people who will see and use that contrivance under conditions just as in their own home.

Again, whilst many people would be unprepared to go in for the larger applications of electric heating,

they would probably adopt the smaller applications. The lady members of a household can, as the writer knows, be very favourably impressed with such conveniences as small portable radiators that can be taken anywhere and connected to a lampholder. Then there are electric irons, curling iron heaters, electric hair driers, and one must not forget vacuum cleaners! The people who would be delighted to use these appliances want "educating electrically." They do not know anything about them at present. They want to be taught how useful a servant a small electric motor can be in the kitchen for knife cleaning, polishing various kinds of ware, and other jobs that require much time and labour. The people with a motor-house want to be taught that their electricity supply is useful for warming the motor-house when a sharp frost sets in and thus saving them from getting a damaged engine. In short, a new educational publicity campaign to further the use of domestic electricity is badly needed; and now would seem to be the time for it, just when the industry is in need of all the support it can get.

[Yes; but the lampholder propaganda is a dangerous one, and is apt to result in ruined holders and flexible cords, with consequent irritation to the user. Let us have the publicity campaign, but not in terms of lampholders.—Eds. Elec. Rev.]

PARLIAMENTARY NOTES.

(From Our Special Parliamentary Reporter.)

Electricity (Supply) Bill.—This Bill was considered in report on July 25th.

Mr. Neal, Parliamentary Secretary to the Ministry of Transport, moved a new clause empowering the Electricity Commissioners to exclude from the area of supply of a power company any part of an area in which any right of the power company to supply electricity was subject to the absolute veto of some other authorised undertaker and any part of that area which at the time of the local inquiry was not being supplied by the power company, and which could be better served by the Joint Electricity Authority itself, or acting through any authorised undertakers. He said that the new Clause had been agreed on between the Government, the Power Companies Association, and the Association of Municipal Corporations.

Mr. G. Balfour said that, in his view, this would authorise the Commissioners to over-ride the authority given by Parliament to a company, and might deprive a company of an area which it was prepared to supply as soon as a request was received from an intending consumer, and in respect of which expenditure might have been incurred with a view to a supply being provided.

The clause was agreed to.

On the motion of Major Hills, a new clause was agreed to allowing a railway company which took a supply of power to use it for traction outside the area of supply of the electricity authority as well as inside it. Other new clauses agreed to related to payment in respect of stand-by supplies of electricity, and set forth the conditions on which restrictions on generating stations and obligation to take supply from them were not to apply.

The report stage of the Bill was concluded, and on the motion for the third reading, Mr. Hopkinson said that if the scheme embodied in the Bill were carried out it would put the supply of electricity on a syndicalist basis under which geographical monopolies would be created. To put the electrical undertakings on such a basis meant that the consumer was going to pay just as in the case of the railways.

The motion for the third reading was carried.

Wireless Telegraphy and Signalling Bill.—During the Committee stage of this Bill on July 25th, Mr. R. Richardson said that he understood that under the regulations British-made wireless sets were to have some preference. He asked what was the nature of such preference, and how were the public to be protected against exploitation?

Mr. Kellaway, Postmaster-General, replied that the intention was to limit licences for a period of two years to receiving sets manufactured by British firms. There was no risk of the users being in any way injured. They would be if there were not effective competition, but he was satisfied on this point. If there were a danger of the manufacture becoming a monopoly of one firm, there might be justification for allowing foreign-made sets to be imported; but there were some twenty firms in the country which were anxious to manufacture and to place on the market these receiving sets. It was clear, therefore, that the interests of users were adequately protected.

The Committee stage was concluded and the Bill was reported to the House.

Wireless Broadcasting.—On July 27th, Mr. Kellaway, the Postmaster-General, replying to questions, said that no licences had yet been issued to establish broadcasting stations, but he understood that the principal manufacturers of wireless apparatus in Great Britain would combine to form a company or companies to provide broadcasting services. Any *bona-fide* manufacturer in this country would be admitted to membership of any company so formed. It was proposed that the receiving apparatus which might be used under the licence, should be limited to types submitted by members of the broadcasting companies, and that it should conform to certain technical standards.

The functions of the Post Office would be limited to approving types of apparatus submitted by members of the company, and inspection of individual sets would not be necessary. Those who had constructed their own receiving sets or had already purchased imported receiving sets would be allowed to use them. The revenue required for providing the services would be derived partly from a contribution by the manufacturers to the company and partly by a proportion of the annual licence fees.

On July 30th, Mr. Kellaway informed Mr. Raffan that it was intended that the apparatus which might be used for the reception of broadcast matter should be limited to types submitted by members of the proposed broadcasting company or companies by which these services would be provided.

Wireless Telegraph Act.—On July 28th, Capt. W. Benn moved to omit the Wireless Telegraph Act, 1904, from the scope of the Expiring Laws (Continuance) Bill, on the ground that the Postmaster-General had now before the House the Wireless Telegraphy and Signalling Bill. But his main reason was the proposed improper use by the Postmaster-General of his powers under the scheme for broadcasting wireless messages. Broadcasting was put into the hands of a combine with regard to which the House had been given but little information, and, secondly, the apparatus to be used for the transmission or reception of messages must be of British manufacture. Why, he asked, should not a person who obtained his licence be at liberty to construct his own apparatus, or buy apparatus that was made abroad?

Mr. Kellaway, in reply, denied that any monopoly was possible under the terms he had already indicated. The electrical firms of this country had reached as high a degree of efficiency as any in the world. The scheme was open to every *bona-fide* electrical manufacturer in this country.

The amendment moved by Capt. Benn was rejected by 126 votes to 30.

Underground Fares.—On July 27th, Mr. Gilbert asked the Parliamentary Secretary to the Ministry of Transport whether he could announce the decision of his Department regarding an inquiry into the present fares of the underground railways of London.

Mr. Neal replied that it had been decided to ask the Rates Advisory Committee to advise the Minister, in pursuance of Section 6 of the London Electric Railways (Fares, &c.) Act, 1920, as to what, if any, modifications should, in the circumcumstances, be made in the fares now in operation and charged by the companies under that Act.

Private Bills.—In the House of Lords on July 25th, the Grampian Electricity Supply Bill, and the London County Council (Tramways and Improvements) Bill, were read a third time and passed. The North Metropolitan Electric Supply Bill was read a third time in the House of Commons on July 26th.

On July 30th the Black Country Tramways and Light Railways Bill was read a third time in the House of Commons.

Vulcanised Fibre.—On July 30th Dr. Murray asked the President of the Board of Trade, whether his attention had been drawn to the fact that the standard price of American vulcanised fibre in this country for several months past had been 1s. 7d. per lb.; whether he was aware that the price quoted by the British firm which was the complainant before the committee appointed under Part III of the Safeguarding of Industries Act was 1s. 3½d.; and on what grounds he considered a *primâ facie* case to exist for proving that sales of American fibre, which was the raw material for many trades, were causing, or likely to cause, unemployment in the British industry?

Mr. Briant asked why the meeting of the committee appointed to consider the complaint and application for a duty of 33⅓ per cent. on imported vulcanised fibre, which was fixed for August, had been adjourned; whether this complaint was only made by one firm employing a small number of people; if so, in view of the serious position to which many firms which found it necessary to import this substance to carry on their business were exposed, and seeing that the prices of the imported article had not varied substantially for the last six months, would he see that this case should either be heard at once or dismissed?

Sir P. Lloyd-Greame, Secretary to the Overseas Trade Department, said that a complaint in respect of American vul-

canised fibre was made on April 7th by the British Electrical and Allied Manufacturers' Association, acting on behalf of one of its members. As there appeared to be *prima facie* evidence that the American price in this country current at a very recent date was below the British cost of production, as defined in the Safeguarding of Industries Act, the complaint was referred to a committee. He understood that the Committee had been informed that about April last the American price was increased, but in all the circumstances he thought that the Committee should proceed with its inquiry, and he did not propose to interfere with its discretion as to how that inquiry should be conducted. Pending a report, he did not think it would be proper for him to make any statement on the subject, but as to the position of importers he would refer Mr. Briant to the provisions of Section 4 of the Act.

Decisions of Electricity Commissioners.—Sir P. Richardson asked the Parliamentary Secretary to the Minister of Transport, whether, in the interests of the electrical industry, he would take steps to reduce the time now elapsing between the holding of inquiries and the publication of their decisions by the Electricity Commissioners; and whether he would take steps to expedite generally the procedure before the Electricity Commissioners and bring it more in accordance with the duration of proceedings before Select Committees.

Mr. Neal said that every effort was made by the Electricity Commissioners to publish their decisions as early as possible, but in view of the numerous and difficult points, both administrative and technical, which were involved in their more important inquiries, some time must necessarily elapse before the promulgation of a decision. The Commissioners informed him that the passing of the Electricity (Supply) Bill would tend materially to expedite matters.

CORRESPONDENCE.

Letters received by us after 5 p.m. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

The Sale of Wireless Apparatus.

The letters under the above heading in your July 7th and 14th issues are obviously intended to convey the perfectly legitimate exception taken by the writers to the usurpation, and the undoubted exploitation in vogue, of the rights of the genuine electrical engineer in business. It is coincident at this juncture that I should come across a cutting from the *Electrician*, five years old, under the heading "Electrical Trade Anomalies," and written by J. M. M. Munro.

I would advise your readers, at least those to whom the article applies, to read this authentic and "straight to the point" exposition of the state of feeling in the year 1917. Now, after five years of alternate slumps and booms in trade, the broadest outlook reflects a more hopeless plight than that outlined by Mr. Munro.

It is conspicuous in many of the discussions appearing in the Review upon the subject matter that a remedy is suggested through the medium of the Electrical Contractors' Association, and that one has merely to become a member to render his business exclusive. Admittedly, such an association may be a very desirable medium for an interchange of opinion of exclusive information upon current topics of special interest to its members, but, and here let's get down to "clay," it cannot assure its members preferential treatment from wholesale houses on the material side of the job, or discriminate between the "electrical sanitary engineer" and the genuine electrical engineer on the installation side where skilled supervision plays an important part, and is mainly responsible for the compliance of an installation with the various rules in force.

I, for one, hold the view, therefore, that the remedy is as yet beyond the reach of the E.C.A., and, further, so far as I have been able to ascertain, its doors are open to all and sundry. Briefly put, the position at present appears to be, that so soon as a plumber attains a position in his business to be able to employ a wireman, and provided the latter gentleman is a member of the E.T.U. or, preferably, holds some sort of office in his district branch, the said plumber starts and continues with each and every facility enjoyed by his only competitor.

In all but a few isolated cases there is no demand for the really good jobs, since they can be carried out quite as well in the public eye by the sanitary engineer as a side line.

Would it not be in the interests of the trade generally if the E.C.A. persuaded municipal and supply company engineers to jointly formulate conditions under which electrical work may be carried out, and by whom, upon their respective systems? They, as engineers of a supply undertaking, have the monopoly of supply in an open market to meet the demand created by the activities of the trade in machinery and appliances. We also, as electrical engineers, think (merely think) that the commodities or consuming devices, from the sale and installation of which we live and have our being, ought, either by preference from the manufacturers, or recognition by the supply authorities, to come under a fittings and accessories clause.

On this point one need not travel far afield to find motors, starters, fans, radiators, ring (and other) lamps, vacuum cleaners, irons, &c., on display in the windows of plumbers and ironmongers; in fact, the "whole boiling" of the electrical engineer. The trade as a whole, both in supplies and its *personnel*, is sadly in need of a weeding-out process, and both factors are at the present time polluted.

In conclusion, I am with Mr. Munro in so far that it is a curious anomaly.

Engineer Contractor.

July 22nd, 1922.

[The above letter has been abbreviated.—Eds. Elec. Rev.]

D.C. Meter Testing.

Although it is now some years since "I shook the dust" of a meter testing and standardising department of a large corporation "off my shoes," I am still keenly interested in meters.

One cannot refrain from expressing astonishment on reading—in these days—a description of "an arrangement" for the above work in your July 28th issue.

Mr. "J. W.B.," however, appears fully alive to the difficulties that will have to be contended with, and I feel sure other meter engineers will not envy the user.

There was no battery room in my last job, but the chief "saw to it" that we had a battery and made space for it with control boards, &c. I have good reason to believe it is still rendering good service to my successor in the performance of his functions.

Without this plant it would have been impossible to bring the "units sold" figure so close to the "units generated." How can one standardise meters, vital instruments in a supply undertaking, down to 1/40th, 1/20th, and starting currents, any load for that matter, with standard instruments and unsteady, uncertain amperes? Towards the end of the description one reads that an extra observer is engaged in keeping the current steady!

I will not digress further beyond saying that, as a reader, I regret I am unable—as the writer suggests—to see any modifications to such an arrangement, but would strongly advise others contemplating d.c. meter testing to use a battery—having used both methods myself.

J. C. Elvey.

London, W.C.2,
July 29th, 1922.

The I.E.E. Wiring Rules.

Many of us who are interested in electrical installation work will, I feel sure, welcome, and generally endorse, Mr. J. R. Willingham's letter, published in your issue of July 21st. There is amongst many a feeling that the above rules are unsatisfactory, but at present they are the only approach to standard available, and are generally accepted as such. That the standard of wiring installation work requires raising few will deny; however, ask any man you know and he will almost invariably abuse the I.E.E. rules, but will seldom put his finger on any one clause and say: "this is rot; it should read," &c. Mr Willingham confines his remarks to what I term the home installation, but they apply with 100 per cent. greater force to the industrial power installation. All must be more or less familiar with some of the fearful and wonderful local rules relating to motors and their starting currents, &c., particularly on a.c. systems. Again, of late, very rightly, in my humble opinion, the call is for H.O. type of gear. Query: What is H.O. equipment? How does one stand with regard to standards? In student days we learnt that 746 watts equalled one electric horse-power. I have yet to meet the motor rated at 1 h.p. which will only draw 746 watts from the line, yet quite a number of important undertakings do their calculations on this 746 figure for all and every motor calculation or connection to the main.

At last supply men are waking up to the fact that there is such a thing as "power factor" blighting their a.c. system. Cos ϕ looks quite pretty in print, but means little or nothing to quite a number of supply station men. When the "powers that be" give up talking about cos ϕ, and our mains men really appreciate that an angle of lag of 45 degrees corresponds to a cos ϕ of 70.7, and that at this power factor, for every 70.7 per cent. of revenue earning current an equal current in magnitude is also flowing, which not only fails to earn revenue, but actually produces, amongst other things, C^2R losses whilst inductively impairing the voltage regulation, in addition to all-round capital inflation, then we shall begin to make real progress. Had the reprehensible power factor properties of the induction motor been generally appreciated in the early a.c. days, possibly development would have taken place on more satisfactory power-factor lines. During the late war the electric furnace made huge strides owing to its success from the users' point of view. Likewise the arc welder is progressing without anyone in the early stages calling attention to the fact that all arcs operate at a

very low power-factor. In conclusion, I sincerely trust that those who suffer from low "power-factor" will take up this promising load of arcs as applied to industry before we are further compromised or afflicted with even lower power-factors than we have to-day.

Walter E. Rogers, A.M.I.E.E.

London, *July 23rd*, 1922.

[This letter has been abbreviated.—Eds. Elec. Rev.]

A Maximum Demand Problem.

How far, if at all, will a consumer on a 3-phase circuit, taking his current through a maximum demand indicator (depending on temperature rise) be affected by conditions outside his own premises, *i.e.*, assuming: (1) a very bad power-factor in the supply main; (2) a unity power-factor. It would seem reasonable, as the mains are warmed up by the extra current when power-factor is low, that the maximum demand indicator should be affected adversely too.

A Consumer.

July 25th, 1922.

The I.E.E.'s Outlook.

I was interested in the remarks contained in Mr. J. W. Meares's letter in your issue of the 21st instant, and think that, instead of the *bare* names of candidates for election to the Council of the I.E.E. being submitted to the members, such should be supplemented by a few notes stating their present positions in the electrical world, and a few particulars of their careers.

I venture to think that were the name of such a distinguished overseas member as Mr. J. W. Meares included in the list, many members would welcome the innovation.

I hope that I am not disclosing any secrets of the ballot when I state that I know where one of my votes would be cast, and think it would be by no means lonely, or in poor company.

Is there any reason why the members of the Institution should not be given details of the candidates' qualifications for office?

As at present, it is probable that a good many of those who do vote know little or nothing of the value and personalities of the candidates, and follow, accordingly, the Council's recommendations. If one, for example, may think that three of the names submitted are in his opinion suitable for his representation on the Council, he votes accordingly, but the probability is that, finding he has further votes, and thinking it is a pity to waste them, he uses them all, and so negatives his initial selection.

It would be interesting to hear what proportion of the members take sufficient interest and trouble to fill up and return their ballot forms.

In Parliamentary, municipal, and other elections, candidates' qualifications are well advertised. If candidates for the I.E.E. Council are worth nomination, it follows that their qualifications ought to be worth advertising.

In the event of the Institution being unable to state particulars of the career of each candidate, and I don't see why it cannot be done, we have the obliging Press to elaborate what has previously been done, and so give greater publicity to the matter, and secure an adequate representation.

Should the Institution provide such details, the Press will, no doubt, review and, where deserved, supplement them.

I await with interest next year's ballot paper, and hope that, if Mr. Meares's name is among those submitted, he will find his election will prove his "fact" to be fiction, at least as far as he himself is concerned.

Gus. C. Lundberg.

London, N.7, *July 26th*, 1922.

Where are the Wiremen?

I had no intention of entering into a long correspondence on the above subject, I am much too busy for that; however, I must reply to your correspondents who, with few exceptions, seem to make veiled attacks on myself. What I wanted was recommendations from engineers; not applications for the post.

In reply to "One Applicant," my letter was sent with the advertisement, but owing to lack of space in your "Correspondence" columns was not inserted till the week following. The letter, of course, refers to a former advertisement. In the present instance the applications would be nearer a thousand than two hundred. I never asked for any embellishments, and am not lax, or fastidious, and fully agree that it is a simple job that is vacant. In reply to the "Ex-I.E.E.," I never suggested that the applicants were incompetent, and if he is not applying for any jobs under a box number, it may be a surprise to him to hear that the present position I hold was secured by applying for the position under a box number.

Personally, I am always proud to show my references, and I expect whoever is appointed will be a stranger to me; we do not require personal details, only references as to experience. My primary reason for putting the advertisement under a box number was to save unnecessary expense to applicants, several of whom would have at once run down to see me, and as there is only one vacancy it is obvious considerable expense would have fallen on men who could ill-afford it. This is born out by several applicants who desire an interview.

In reply to "Indentured Electrician," no, it's not a case of "too old at 40." We do not want a man with a large family to take a junior's job, and cannot afford it. In reply to "Fed Up," no, we do not require a specialist, only a man with average intelligence. Finally, in answer to "Not 1 in 200," who said anything about one and a half per cent. of the applications being not satisfactory? By the tone of his letter I should not like to accept anyone he recommended; and to prove he is right in his concluding paragraph that the trouble is at the top, I give a few examples below which will prove whether I did or did not understand my business. I might have been easily suited—that is perhaps what he means; if not, he has a lot to learn, including not to jump to conclusions too quickly.

The first man I had had some 15 years' experience and had excellent references and said there was not a job I could put him on which he could not tackle. I gave him a job of eight lights to do and he wired some lights in parallel, some in series, and some would not light at all. On another job of four lights, at £2 per point for the job, his time came to over that, and when he had finished I found he had wired a hall light so that one had to go into the dining room to switch on the hall light and into the hall to switch on the dining room light; these are only two of his achievements. No. 2 I sent to connect a small sausage machine motor and found he had put the armature in series with the no-load release coil of the starting switch; this man left me to take a three-weeks' job at a few pence more per hour. No. 3 proceeded to upset a Bastian meter on a consumer's premises, but did not observe the reading and filled it up to what he thought it ought to be, which was ten units above the actual reading on the top of the scale. He wired a few two- and one-light jobs and none of the lamps would light. No. 4 had a job with me at four times the rate he was previously getting, and after three days' work came to me and said "hired by the hour, hour's notice." I said "correct," and off he went. Of my present staff, two have been with the firm for nearly twenty years, one for three years, one about seven years, and one four years. I agree, Mr. Editor, that some of the applications are heartrending, and I will as soon as possible thank the unsuccessful ones and announce in your columns when the vacancy is filled, which will be in about a week's time. I have not up to the present had time to deal with the large number of applications.

Engineer.

July 31st, 1922.

[This correspondence is now closed.—Eds. Elec. Rev.]

The I.E.E. Summer Convention.

In your issue of June 16th, Mr. A. B. Muirhead, commenting on your leading article of June 9th, gave us some information on low grade fuel. He says it will be agreed by those in a position to judge, that power developed from such fuel can be obtained at a price with which water power in this country has no chance of competing. Now, this statement is just a little misleading. While the economical position at the majority of mines remains as at present, there is little, if any, of this low grade fuel, most of it being required in preparing the better grades for the market. I am in touch with a large colliery worked on modern lines. Its electrical system is 3-phase, a.c.; it is composed of three 1,300-kW sets combined. The average load is two-thirds the capacity; the power factor is a lagging one varying from 0.3 to 0.7. The water used for steam generation is unfiltered, and is mostly pumped from the mine, a good percentage of it being mud. It takes all the low grade fuel at the mine with a quantity from smaller collieries mixed with a better grade to generate the steam used at this mine. One of the sets is a mixed-pressure turbine and it is the usual thing to see exhaust steam blowing off, and no questions asked. As one who has worked among water-driven machinery for a time, I should say the antique water-driven wheel could compete favourably with this fuel as it is used at some mines to-day.

J. Shiels.

Glasgow, *July 29th*, 1922.

Where are the Young Men of the I.E.E.?

My attention has been drawn to a letter which appeared in your issue of July 21st, signed by Kenneth Pittaway, in which the following statement is made:—

"Such Associations as the A.M.E.E., the S.T.E., and the E.P.E.A. are doing their utmost to set a 'first-class profession' upon a first-class basis, as far as 'salaries and status are concerned.'"

I feel sure that the writer does not wish to make a statement which cannot be borne out by facts, and I have to say

that the Association of Mining Electrical Engineers, to which presumably he refers, does not interfere in any way whatever with the question of salaries of its members.

A. B. Muirhead,
Glasgow, *July 29th*, 1922. *President, A.M.E.E.*

[The letters A.M.E.E. were obviously intended to stand for the Associated Municipal Electrical Engineers (Great Britain and Ireland).—Eds. Elec. Rev.]

Removal of a Static Charge.

During the process of rinsing silk and other garments in warm dry benzine, static electricity is generated in such quantities as to ignite the vapour by a spark discharged under certain conditions.

All the metal tanks and machinery are electrically earthed, but owing to the benzine being a non-conductor it appears to retain sufficient electricity to produce a spark on discharge, and I should be much obliged if any reader could give information as to how to conduct the electricity from the surface of the benzine as fast as it is generated.

F. W. F.

July 19th, 1922.

Whitegate Brick Co. v. R. O'Brien & Co.

With reference to the article in your July 21st issue on page 106, we wish to call your attention to the fact that we were not backed in any way whatever by the English Electric Co. in this case. We carried out the defence entirely ourselves.

We trust you will announce this in your paper, as the article mentioned above has caused a wrong impression in the trade.

R. O'Brien & Co.
Manchester, *July 31st*, 1922. F. Hulme.

[The "article" was a report of legal proceedings, and the statement alluded to was that of counsel for the plaintiffs.—Eds. Elec. Rev.]

BUSINESS NOTES.

Bankruptcy Proceedings.—Leslie Rowland Henson, 23, Green Lanes, Islington, London, N.—The public examination of this debtor was held on July 28th at the London Bankruptcy Court before Mr. Registrar Francke. The accounts, showed debts £165, and assets £72, subject to realisation. In the course of his evidence the debtor stated that for fourteen years he was in the employ of various firms of electrical engineers, and in June, 1919, commenced business on his own account. Owing to lack of capital and the slump in trade he could not make it a success, and being pressed by creditors last May, he petitioned the Court. The examination was concluded.

Charles Archibald Henderson, 63, Queen Victoria Street, E.C., and The Grove, Sutton.—A sitting of the London Bankruptcy Court was held on July 28th before Mr. Registrar Francke, for the public examination of this debtor, who failed in April last, with total liabilities £24,371 (unsecured, £23,405) and net assets valued at £18,359, after deducting £205 for payment of the preferential claims. In reply to Mr. Vyvyan (Official Receiver), the debtor stated that in November, 1919, upon being demobilised from the Army, with the rank of lieutenant, he purchased for £450, which he obtained on loan from relatives, the business of a merchant in insulating materials carried on at 63, Queen Victoria Street, under the style of "Allen & McMaster," and he had since continued it under the same style and at the same address. In October, 1921, he, under a scheme entered into with other persons for obtaining the finance necessary for the proposed formation of a limited company and the equipment of a factory in connection therewith for manufacturing ebonite, became the nominal borrower of £20,000 from an insurance company on the security of policies effected with it on the lives of three persons, and on the guarantees of four others. One-half of that sum was to have been applied for the purposes of the said company and factory, but the whole loan, less certain deductions, was applied by his associates to another company which they were financing. Witness attributed his insolvency (*a*) to a falling-off in his business since June, 1921, owing to a curtailment of his credit consequent upon its becoming known in the trade that he contemplated manufacturing ebonite, which he had hitherto purchased; (*b*) to bad debts, trade and personal; and (*c*) to heavy discount charges and interest on loans. The examination was concluded.

J. E. Rollinson, electrical engineer and contractor, 5, Tavistock Chambers, Beastmarket Hill, Nottingham.—Receiving order made July 26th, on debtor's own petition.

C. P. M. Downie (P. Downie), electrical engineer and factor, 355a, Westborough Road, and 88, Ronald Park Avenue, Southend-on-Sea.—Trustee, Mr. T. Gourlay, Official Receiver, 29, Russell Square, W.C., released July 21st.

T. Hyde, electrician, 180, London Road, Croydon.—Trustee, Mr. T. Gourlay, Official Receiver, 29, Russell Square, W.C., released July 21st.

R. H. Liddell (Liddell & McInnes) electrical engineer, 4, The Crescent, Carlisle.—First and final dividend of 5s. 6¼d. in the £, payable August 8th, at the Official Receiver's office, Carlisle.

H. S. Rogers, electrical engineer's sales manager, 21, Derby Street, Walsall.—Receiving order made July 26th on debtor's own petition.

R. A. Depledge, electrical engineer, 53, Frodingham Road, Scunthorpe.—Last day for proofs for dividend, August 16th. Trustee, Mr. S. M. Forrester, 1, Town Hall Street, Grimsby.

W. W. Threapleton, electrical and mechanical engineer, Thornbury Road, Bradford.—First and final dividend of 6s. 9d. in the £ payable at the Official Receiver's office, 12, Duke Street, Bradford.

W. Caldwell (Caldwell & Son), electrical engineer, 26, Victoria Road, Hale, Cheshire.—Receiving order made July 29th on debtor's own petition.

Company Liquidations.—Albert Lee & Co., Ltd., lighting accessories merchants, 8-9, New Zealand Avenue, London, E.C., and at Glasgow and Newcastle.—In pursuance of the provisions of the Companies (Consolidation) Act, a largely-attended meeting of the creditors of the above was held on July 24th at the offices of the London Chamber of Commerce, Oxford Court, Cannon Street, E.C.4. The chair was occupied by Mr. Thomas Keens, of Messrs. Keens, Shay, Keens & Co., I.A., 25, College Hill, E.C., who had been appointed to act as the liquidator in the voluntary liquidation.

The chairman, at the outset, stated that at the request of the principal creditors he was appointed as the liquidator, and he was not the nominee of the shareholders. A large number of proxies, totalling nearly £70,000, had been received in favour of the voluntary liquidation being continued with him (Mr. Keens) as liquidator. The directors desired him to express their regret at the position which had arisen, and he was asked to state that it was hoped that the outcome of the liquidation would be the introduction of a scheme for the reconstruction of the company.

The statement of affairs presented showed ranking liabilities of £87,185. Of that amount £36,943 was due to the unsecured creditors, while there were fully-secured creditors for £12,622. The securities held were valued at £17,160. There were also partly-secured creditors for £80,129, of which £50,242 was expected to rank. The assets were estimated to realise £63,594, from which had to be deducted £1,244 for preferential claims, and £41,651 due on debentures. The net assets therefore amounted to £20,700, or a deficiency, as regarded the unsecured creditors, of £66,485. The assets were as follows:—Cash at bank, £180; cash in hand, £44; stock-in-trade at cost, £70,000, expected to produce £39,425; fixtures, fittings, &c., £1,228; investments, £1,223; loans on mortgage, &c., £2,300; lease and goodwill, £1,200; good book debts, £10,456; doubtful and bad debts, £4,728, estimated to realise £1,000; debtors on agency accounts, £2,000; and surplus from fully-secured creditors, £4,538.

Mr. Keens said that the partly-secured creditors were five in number. The Deventer Glas Maatschappij, of Holland, were partly-secured creditors for £28,329. As security they held debentures in the company to the extent of £9,300, and were unsecured for the balance of their claim. Messrs. George Wills & Sons, Ltd., were creditors for £24,618, and they held debentures to the value of £3,500 and stock valued at £5,082, and were included as unsecured creditors for £16,036. Messrs. M. Samuel & Co., Ltd., were partly-secured creditors for £22,152, their security consisting of third debentures for £3,200 and stock valued at £5,707. The amount of their unsecured claim was therefore £13,245. Mr. F. A. Fairchild was a partly-secured creditor for £4,381, and he held third debentures for £2,700, which were issued on April 10th last. He was unsecured for £1,681, but some question might arise as to the validity of the issue of the debentures to him. The remaining partly-secured creditor was scheduled for £648, of which £250 was unsecured. There had been three issues of debentures. The first debentures were for £10,000, the second for £6,000, and the third for £25,000. In his opinion certain of the second and third debentures were open to some question. A receiver for the debenture holders was appointed on June 24th last. It was contemplated that the Newcastle branch should be closed at once. On December 31st, 1920, the company's accounts showed a debit balance on trading of £1,241. The share capital then amounted to rather more than £11,000, and, as regarded the shareholders, there was a surplus at the date mentioned of £10,364. Since December, 1920, there had been a loss of £31,925 incurred in carrying on the business. The present position was due to that loss, together with the writing down of the assets and claims for losses on contracts amounting to £36,459. The company then entered into large transactions and negotiations commenced for the introduction of £50,000 capital by three foreign firms. The chief reasons which actuated those firms

were the connection which Albert Lee & Co., Ltd., possessed, and the contracts which had been entered into for goods, and which were considered to be extremely advantageous. The premises at Cambridge Heath were extended and showrooms opened in London. The scheme which the company had intended to follow did not, however, materialise owing to the slump in trade. Contracts thought to be advantageous resulted in serious losses. Further, there were many serious cancellations of contracts.

Proceeding, the chairman stated that the company was registered on May 27th, 1916, with a nominal capital of £5,000, and it took over an existing business for which it paid £2 in cash and the balance in shares. Subsequently the capital was increased to £12,500. During the year to January 31st, 1917, there was a loss of £324, whilst in the following 12 months there was a loss of £324 on a turnover of £38,305. During the year to January 31st, 1919, the turnover fell to £19,131, with a loss of £3,473. In that year the whole of the staff was in the Army, and temporary employés had to be engaged. During the period to June 30th, 1920, the London sales were £73,491, with a net profit of £4,518, and £7,000 was carried to reserve. In the same period the Newcastle branch had a turnover of £2,856, with a loss of £153. During the six months to December 31st, 1920, the sales were £44,945, with a loss of £2,824, after a heavy writing down of stock. There was a loss at Newcastle of £20, on a turnover of £7,593. During the 18 months to July 5th last the London turnover was £69,897, with a loss of £19,817, while at Newcastle the sales amounted to £7,949, and there was a loss of £8,300. He agreed that the loss in the latter period seemed extraordinary, and he could not explain it at all. During the same period the sales at Glasgow were £14,782, with a loss of £3,759. The overwhelming feature in connection with the losses was the depreciation of the stocks. As previously intimated, there was a desire for a reorganisation of the company. Certain foreign manufacturers had expressed a wish to acquire the goodwill and connection of the business. Negotiations had been opened for the sale of the goodwill and lease, and it was proposed, as part of the scheme, that the manufacturers referred to should act as selling agents for the receiver and the liquidator with a view to disposing of the assets in the ordinary way of trade. If that was done it was possible that the assets would realise more than the figures at which they appeared in the statement of affairs. If the assets were sold at a break-up he was unable to say what they would fetch. If the scheme went through, the intention would be for the assets to be sold and part of the consideration would be paid in cash. That would enable a small composition to be paid to certain of the creditors, and deferred shares in a new company would also be issued. In addition, there would also be available for the creditors any moneys which might be in hand at the close of the receivership. Any scheme would have to be submitted to the creditors.

In answer to questions, the chairman stated that certain debentures were issued last April to a number of creditors, and in his opinion such debentures were of doubtful validity.

A resolution was unanimously passed confirming the voluntary liquidation of the company, with Mr. Keens as the liquidator, and it was decided that an application should be made to the Court for the appointment of a committee of inspection consisting of the representatives of five of the principal creditors. The following are creditors:—

	£		£
Atkinson Bros.	200	Gas Light & Coke Co.	33
Adams & Co., Ltd.	15	General Electric Co.	48
Arova & Co.	14	Great Eastern Railway	18
Asnew Electric Lamp Co. ...	54	Hillbar Press	95
Burners (1921), Ltd.	41	Harper & Co., Ltd.	23
Bedford & Co.	241	*Hardware Trade Journal* ...	76
Bale & Sons	34	Harris, T.	832
British Thomson-Houston Co.	21	Harper & Broom	179
British Thomson-Houston Co.	22	Harris, A	916
Bamaglicht Ges., M.O.L. ...	12	Heath & Sons, Ltd.	61
De Boer, H. G.	40	Hawkins Bros. & Co.	13
De Boer, H. F.	40	Hartland & Eastwood	28
Bathurst, A.	16	*The Ironmonger*	75
Bathurst, J.	174	*Ironmongers' Chronicle* ...	73
Cooper, G. R.	19	James, H., & Co.	61
Caldwell & Trotter	40	Jowett, F. W.	27
Crick & Booth	97	Joseph, C. F.	73
Chisholms, Ltd.	25	Kerr, W. P.	94
Crossling, G., & Co., Ltd. ...	33	London Telephone Service ...	22
Carter, Paterson & Co. ...	20	Marks, H.	18
Clyde Shipping Co., Ltd. ...	30	Middlesbrough Steel Tube Co.	27
Catchpole & Maurice, Ltd. ...	15	Metaaldraadlampenfabrick Volt.	19
Celtic Stamping Co., Ltd. ...	60	Mayer, W. G.	38
Curtis, H., & Son	28	Met. Borough of Hackney ...	38
Cooper & Smith	11	Malleable Fittings, Ltd. ...	12
Cunningham, E. S.	21	Marks, A.	97
City of London E.L. Co. ...	23	Morris, J. R.	367
Canning, W., & Co.	13	National Carbon Co.	151
Cooke & Segal	504	Niederlansatzer Glaswerks ...	70
Cable Accessories Co.	12	Newcastle Corporation	16
Deventer Glas Maatschappij ...	12	Oakes, W.	72
Deventer Glas Syndicaat 26,142		Pirelli, Ltd.	23
Dernier, L., & Hamlyn, Ltd.	15	Pilot Mantel Co.	203
Davies, Kent & Stewart ...	45	Pugh, E., & Co.	27
Davis Nicholls	15	Pomells, Collingh, J.	40
De Carra & Allen, Ltd. ...	38	Phillips, D. J., & Co.	344
De Blecourt	71	Patrick, A. C., & Co., Ltd. ...	14
De Blecourt, W. F. H. (decd.)	379	Parrott, C. K., & Co., Ltd. ...	56
Eagle, Star & British Dom. Insurance	92	Panel Ateliers, Albert	62
East London Mica Co., Ltd.	11	Reid & Gregory	15
Electrical Review	57	Reliance Elect. Wire Co. ...	14
Elect. Distributing Co.	42	Reid & Gregory	12
Feaver, John	11	Roneo, Ltd.	16
Cerpal	25	Robbins R. W., & Co.	12
Great Eastern Railway	15	Rylands Glass & Eng. Co. ...	13
Redman & Co., Ltd.	92		
Reid & Son	24	Scupham & Wood	20
Rolac	48	Surveyor of Taxes	27
Rundel, A.	39	Truscott, James, & Co., Ltd. ...	13
Riches, Mrs.	11	Thompson & Norris	22
Shanks, Ltd.	15	United Kingdom Lighting Trust	24
Schomkers, Ltd.	73	Underwood (Manchester), Ltd.	76
Standard Gas Fittings Co. ...	498	United Flexible Metallic Tubing Co.	87
Sanger, J.	11	Van Tennsya, J.	1,042
Satchwell, J., & Co.	41	West End Incandescent	11
Soutter, W., & Sons, Ltd. ...	15	West African Publishing Co. ...	31
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Smith, P. W.	200	Wakefield & Son, Ltd.	200
Sancker, T.	48		
Schalton, E.	20		

Technical Intelligence Service, Ltd.—A meeting of members is called for September 2nd at Arundel House, Arundel Street, Strand, W.C., to hear an account of the winding-up from the liquidator.

Technical Review, Ltd.—A meeting of members is called for September 2nd at Arundel House, Arundel Street, Strand, W.C., to hear an account of the winding-up from the liquidator.

Brotherton Ediswan Tubes & Conduits, Ltd.—Winding up voluntarily. Liquidator, Mr. R. H. Johnston, 49, Queen Street, Wolverhampton.

Dissolution of Partnership.—Melling, Son & Pilkington, mechanical, electrical and automobile engineers, 22a, Virginia Street, Southport.—Messrs. W. Melling (Senior), W. Melling (Junior), and F. W. Pilkington, have dissolved partnership. Debts will be attended to by Messrs. W. Melling (Senior), and W. Melling (Junior).

Private Arrangement.—T. A. Keating, 186, Westcombe Hill, Blackheath, electrical engineer.—The following circular has been issued in this matter by Messrs. Corfield & Cripwell, accountants and auditors, of Balfour House, Finsbury Pavement, E.C.:—"With reference to the recent adjourned meeting of creditors in this matter, we beg to inform you that upon our further representations the debtor has undertaken to carry through a composition scheme of 17s. 6d. in the £, in place of 15s. in the £, arranged at the last meeting. The necessary deed of composition and assignment has been executed by the debtor and the trustees, and the matter is being immediately placed upon a proper footing."

Trade Announcements.—Mr. Bernard Goldenberg, for many years representative of the Harland Engineering Co., Ltd., of Manchester, has now taken charge of the wholesale electrical department of Walter E. Deeley, 18, Victoria Buildings, Manchester. He desires to receive price-lists for kinema carbons, accessories, switchgear, and everything electrical.

Mr. William Sharp, M.I.Mech.E., constructional engineer, Messrs. Alex. Jack & Co., Ltd. (Motherwell), and Messrs. Wright, Anderson & Co., Ltd. (Gateshead-on-Tyne), have removed their offices in London to 11, Carteret Street, Queen Anne's Gate, London, S.W., where their telephone number is "Victoria 6529."

The Concordia Electric Wire Co., Ltd., has appointed Messrs. A. McArthur & Co., of 2933, Clarence Street, Sydney, as its sole selling agents in Australia. The company's agents in New Zealand are Messrs. Arthur D. Riley & Co., of Wellington.

Messrs. W. & T. Marshall, of The Burnside Works, Stirling, have opened new showroom premises for electrical appliances, lamps, fittings, &c., at 12, Upper Craigs.

Mr. J. Sheppard has removed to 119, Holland Park Avenue, Shepherd's Bush, W.11. He desires to receive publicity literature from manufacturers of ignition, power, lighting, heating, and other electrical goods.

The Telegraph Condenser Co., Ltd., of Vauxhall Street, Kennington Oval, S.E.11, has appointed Mr. E. W. Dorey as its sales engineer, to handle the sales at home and abroad of static condensers for power factor improvement. The sales business will be conducted from Norwich House, Southampton Street, High Holborn, W.C.1. Mr. Dorey has also been appointed by the Anglo-Belgian Co., of Ghent, as its sales agent in the United Kingdom, for vertical semi-Diesel crude oil engines.

Messrs. Leonard G. Tate & Co., Ltd., electrical contractors, of 20, Bucklersbury, E.C.4, who will shortly be opening a branch establishment and showrooms at 31, Bond Street, Ealing, W.5, desire to receive catalogues of fittings, domestic appliances, accessories, &c.

The "Watt" Electrical Co., Ltd., have changed their address to 161, Westminster Bridge Road, London, S.W., where they desire to receive catalogues of electrical goods.

Catalogues and Lists.—Messrs. Ruston & Hornsby, Ltd., Lincoln.—A well-produced list of "Ruston" cold-starting oil engines, with numerous letters of satisfaction from customers' and details of test results.

Messrs. W. T. Henley's Telegraph Works Co., Ltd., Blomfield Street, London Wall, E.C.2.—List W.A.1, giving illustrated details of unit-type distribution pillars of several patterns.

Messrs. Donovan & Co., 47, Cornwall Street, Birmingham.—A card giving prices of various grades and sizes of cables.

Messrs. Herbert Morris, Ltd., Loughborough.—A booklet (No. 98) giving illustrations and prices of Morris steam cranes, overhead electric cranes, hand-power cranes, battery trucks, pulley blocks, &c.

Electrical Utilities, Ltd., 1-3, Shelgate Road, S.W.11.—Leaflet TF/1, illustrating and describing the "Utility" electric toaster-fire. Priced.

Sterling Telephone & Electric Co., Ltd., 210-212, Tottenham Court Road, W.1.—Leaflets 336 and 327, dealing respectively with the "Magnavox" loud speaker and the "Marconiphone" wireless receiving sets. Illustrated and priced.

Messrs. Pratt & Co., 23, Queen Anne's Gate, S.W.1.—An illustrated and descriptive price list of small wireless receiving sets.

Messrs. F. & C. Osler, Ltd., 100, Oxford Street, W.1.—An album containing about 130 photographs of electric lighting fittings of all types, including bowls, shades, candelabra, lanterns, crystal, alabaster, &c., in many styles of decoration. A useful feature of many of the photographs is the insertion of the principal dimensions. A price list is contained in a pocket in the front cover.

The London Factors & Agents, Ltd., 38 and 39, Parliament Street, S.W.1.—An illustrated list of d.c. motors and dynamos. Priced.

Plant & Supplies, Ltd., 12-13, Henrietta Street, W.C.2.—A price list (No. 2) of "Sceando" metal filament lamps; and List No. 3, giving prices of various sizes and types of v.i.r. cables.

Holidays.—The Midland Electric Manufacturing Co., Ltd., of Birmingham, is closing its offices from August 5th until the morning of the 8th inst., and its works from to-night until the morning of Monday, August 14th. Urgent stock orders will be dealt with during that period.

The works of the Artic Fuse and Electrical Manufacturing Co., Ltd., at Birkenhead, will be closed from August 7th to 12th.

Annual Outing.—The annual outing of the Enfield Ediswan Cable Works took place last Saturday, when considerably over 300 employés, including the works manager, Mr. Heffernon, Mr. Kaye, and several of the works and London office staff, travelled by special train to Southend.

Annual Sports.—The first annual sports meeting of Messrs. A. Reyrolle & Co., Ltd., Hebburn, Newcastle-on-Tyne, was held at their own sports ground, Hebburn, on Saturday, July 22nd. The events, which numbered 36, were admirably organised by a committee composed of the works and management, and were successfully carried out. Three challenge cups were presented by officials of the firm for annual competition. The Hebburn Colliery Prize Silver Band kindly gave their services for the day. It is estimated that there were between 2,000 and 3,000 people present, and as the proceeds at the gate are to be given to the Ellison Hall Accident Infirmary, it is expected that a substantial donation to the funds will be made.

Book Notices.—"The Development of Stainless Steel: Its Properties and Uses." 82 pp., 7 figs., 7 plates. Sheffield: Thos. Firth & Sons, Ltd. Price 10s. 6d.—This volume is a very complete treatise upon the nature and properties of stainless steel, formed by a collection of reports and data from the firm's research laboratories. The first chapter describes four distinct types of steel, classed according to the purposes for which they are suitable. Then the manufacture is dealt with, and various processes such as hardening, tempering, welding, and brazing are briefly touched upon. Mechanical tests provide the matter for the next two chapters, and the information given here is very exhaustive, showing that the anti-corrosive properties of the steel do not detract from its mechanical strength. Chapter VI is devoted to a general description of the physical characteristics of the metal. These include a specific gravity varying but slightly from that of mild carbon steel, and an electrical resistance some 42 times the resistance of copper. The remainder of the volume deals with the effects of a large number of re-agents upon the steel, and the action of a diversity of chemical substances is considered. As this is, so far as we are aware, the only work dealing exclusively with stainless steel, it has a unique value to those interested in the subject.

"Magnetism and Electricity." By J. Paley Yorke, M.Sc. 248 pp. London: Edward Arnold & Co. Price 5s. net.—This is a re-written edition, couched in simple terms, which makes it suitable for even very young students. Magnetism takes up the first half of the volume, and is treated very adequately. The purely electrical part opens with the usual definitions of electricity; the electronic nature of the energy is dealt with very briefly on a different page to that mentioned in the index. Electrostatics, contrary to the usual practice, is dealt with near the end of the book.

"The Trade Industries and Productions of British South Africa." By C. W. Francis Harrison. Pp. 196. Woodchester: Arthur's Press, Ltd., for the Federation of British Industries.

"The Brown, Boveri Review," June, 1922. 17 pp. London: Brown, Boveri & Co., Ltd.—This issue deals with the use of Brown, Boveri turbines for ship propulsion, and describes a number of typical installations.

"Industrial Unrest: A Way Out," by B. Seebohm Rowntree. Pp. 48. London: Longmans, Green & Co. Price 1s. net.

"Transformer Abstracts," Nos. 11 and 12. Charlton, S.E.7: Johnson & Phillips, Ltd.—The first of these useful booklets deals with transformer losses, efficiency, and regulation, in considerable detail. No. 12, which is the last of the series, treats of the parallel operation of transformers, and full consideration is given to the principal necessary characteristics.

The *Financial News* has published (price 7d.) a new edition of its pamphlet "Income Tax up to date" (by H. J. Gully, F.C.A.), in which is given an explanation of the arrangements for winding up the E.P.D. and a table showing what income tax is payable on a given income.

"The English Electric Journal," Vol. II., No. 2, April/July, 1922. London: The English Electric Co., Ltd. Price 1s.—Among the articles contained in this issue are: "A Modern Rotary Converter," "A New English Electric Induction Motor for Medium and Large Outputs," and "An Analysis of Regenerative Braking on Electric Locomotives."

"The Builders', Plumbers', and Decorators' Pocket Book" (230 pp.). London: Thomas Tofts. Price 5s. net.—This is a work likely to be of use to others than those for whom it has been compiled, as it contains a great deal of information upon materials and quantities, and specifications for the mixing of many useful compounds for all purposes. The glossary of terms at the end of the book contains many words not found in an ordinary dictionary.

For Sale.—Borough of Stepney, one 1,000-kW and two 1,500-kW turbo-generators. By direction of the Disposal Board, Messrs. Bowler & Blake will sell by auction on August 22nd and following days, at H.M. Dockyard, Portsmouth, H.M. Gunboat Yard, Haslar, R.A.O.C. Depôt, Hilsea, and the Seaplane Training School, R.A.F., Lee-on-the-Solent, plant, machinery, and electrical equipment. One 300-kW Willans-Siemens d.c. turbo-generator is offered by the Carlisle Electricity Department. (See our advertisement pages to-day.)

Forthcoming Exhibitions.—The following exhibitions are being organised:—

London.—September 2nd to 8th, Radio Exhibition and Wireless Convention; October 13th to 23rd, Commercial Motor Exhibition; November 2nd to 11th, International Motor Show; November 14th to 24th, Marine and Small Craft Exhibition; November 27th to December 2nd, Motorcycle and Cycle Show.

Birmingham.—February 19th to March 2nd, 1923, British Industries Fair.

Manchester.—September 13th to 23rd, Business Efficiency Exhibition; October 6th to 20th, Textile Machinery Exhibition.

Austria (*Vienna*).—September 10th to 16th, International Sample Fair.

Belgium (*Mons*).—November, Commercial Fair.

France (*Lyons*).—October 1st to 15th, Sample Fair.

Italy (*Naples*).—September 16th to 30th, Sample Fair.

Poland (*Lemberg*).—September 5th to 15th, Eastern Fair.

Trieste.—September 3rd to 18th, Sample Fair.

United States (*Chicago*).—October 14th to 22nd, Radio Show.

New Zealand Electrical Imports.—H.M. Trade Commissioner at Wellington (N.Z.) gives, in the *Board of Trade Journal*, tabulated and other particulars of the value of imports into New Zealand during the March quarter of this year. We extract the following details of values of imports of electrical machinery for that quarter compared with the figures of the corresponding quarter of 1921:—

Electrical Machinery.

Country of Origin.	March Quarter, 1922.	March Quarter, 1921.
	£	£
United Kingdom	176,942	248,542
Canada	4,442	7,964
Australia	2,845	7,368
Japan	530	11,729
United States	68,041	105,926
Other countries	14,416	16,357
Totals	£267,216	£397,886

Imports from the five countries named mark heavy falls in value, probably due in a large measure to the lower prices established in the interval between the two periods.

Australian Tariff Decisions.—Amongst the tariff decisions approved by the Customs Department are the following:—Electrical appliances, &c.—Primary batteries, comprising glass jars, porcelain covers, elements, caustic soda (in tin), sufficient only to charge each battery; oil (in bottle), sufficient only for each battery. Item 180 (e), 27½ per cent. under the British preferential tariff, 35 per cent. under the intermediate tariff, 40 per cent. under the general tariff. Hydro-electric machinery, *viz.*, water turbine, 1,180 h.p., 500 r.p.m., 110 ft. head; alternator, 3-phase, 1,000 kVA, 5,500-6,600 V, and necessary switchgear therefor. Item 174: Free, 5 per cent., 10 per cent.—*Reuter's Trade Service* (Melbourne).

Electrical Trade in China.—In the course of an article on the report of the Maritime Customs, the *Board of Trade Journal* gives some information respecting trade in electrical materials. It is stated that the satisfactory development of this branch of the import trade has continued unimpeded by the course of events. The Customs figures for the importation of electrical materials and fittings are 13.2 million taels for 1921, which is a noteworthy advance over the 6.3 million and 5 million taels recorded for 1920 and 1919 respectively. "As might be expected, the adverse trade conditions have caused a marked decline in the sale of small lighting plants, which, however, may also be partly due to the installation of new, or the improvement of existing plants for public light services. Several contracts for large power and light plants for places in the interior were settled during the year, and an increasing tendency to install larger units of 1,000, 2,000, and 5,000 kilowatts is noticeable, while only a couple of years ago 200 and 400 kilowatts were considered sufficient to meet requirements. It is interesting to mention here, as an indication of the progress that is being made in the use of electricity, that current is now supplied during the day in several important centres instead of the plant being run during the night only, as has hitherto been the practice: Nanking, Soochow, and Hangchow are cases in point. As regards electrical accessories, fittings, and lamps, Japanese manufacturers have held the market for wires and cables, porcelain insulators, &c., Dutch manufacturers for lamps, and American manufacturers for the better-class fittings and glassware. Towards the end of the year German glassware fittings appeared on the market at prices which undersold the American product. Altogether this line of trade is in a flourishing condition, with good prospects ahead."

Jackson Electric Cookers.—Many municipal authorities are taking advantage of their powers to hire out electric cooking appliances, and the Jackson Electric Co., Ltd., has secured a number of orders for cookers in this connection. These have been supplied to Glasgow, Hackney, Southampton, and many other places. The accompanying illustration shows a consignment of cookers for the Woolwich Borough Council.

Jackson Electric Cookers for Woolwich.

Municipal Electricity Undertakings.—A circular published by the Conference of Local Authorities Owning Electricity Undertakings says that it is not generally realised how far the growth of electricity supply has been dependent upon the energy and foresight of municipal authorities. It is claimed that the average selling price of electricity from municipal undertakings is approximately one-third less than the average price charged by other suppliers, and statistics are given of the generating stations in London and Greater London. The aim is to urge every consumer to see that nothing is done to prejudice the position of municipal undertakings in schemes for the reorganisation of electricity supply.

Trade Conditions in South Africa.—The general managers of the Standard Bank of South Africa supply the following information regarding trade conditions throughout the Union:—The slight improvement in business conditions reported in June has been maintained, and some increase in ordering reflects a more optimistic outlook on the part of importers. The agricultural implements, mining machinery, and iron and steel markets are dull, but prices are firm. The electrical goods market shows activity, with prospects of expansion in the near future. Stocks are ample in all lines.—*Reuter's Trade Service* (Capetown).

New Russian Electric Lamp.—A Russian journal, the *Pravda*, states that the "Svetlyana" electric factory of Petrograd has brought out a new 100-V electric lamp—its own production—"which from a technical point of view is greatly superior to electrical lamps of foreign manufacture."

The Deficits of the Russian Electrical Industry.—In the U.S. Commerce Reports just to hand there appears an abstract of an article published in the Soviet official daily *Economic Life* of May 11th, "for the accuracy of which the Bureau assumes no responsibility." It reports the holding of a special session of joint committees of the Economic Council, Bureau of Industries, and of various industrial groups and trusts at Moscow on May 10th, with the view of determining the extent to which basic nationalised industries must be subsidised. "According to calculations compiled from data presented by the participants of the meeting, the minimum total requirements of the principal industries for the fiscal year were estimated at 450,000,000 pre-war rubles, of which amount 360,000,000 rubles is for operating expenses and 90,000,000 rubles is for necessary equipment and repairs. Since no such funds are available for the purpose, it was decided to take the course of estimating the sums necessary to cover the deficit which is expected to be incurred within the next three or four months under existing conditions. This cash deficit was figured out for all of the principal industries at 150,000,000 pre-war rubles. The highest share of the deficit was claimed for the metal industry—37,500,000 gold rubles. Next came the textile industry. The mining industry will require 24,250,000 rubles, of which 22,000,000 rubles is for coal mining alone. This amount is equivalent to the estimated cost of three months' output, less about 20 per cent. for proceeds of sales of coal in the open market. The deficit of the electrical industry is estimated at 12,000,000 rubles, distributed as follows: Electrotechnical works, 5,000,000 rubles; central power plants, 7,000,000 rubles.

"The report of the Chief Electrical Bureau, given in detail in *Economic Life*, May 7th, 1922, places the indebtedness of the nationalised electrical industry for wages alone on May 1st at 431,000,000,000 soviet rubles. The chief consumers of the industry are State institutions, which are extremely lax in paying for service. The total arrears in payment of past-due accounts of the various commissariats were estimated on May 1st at 3,000,000 gold rubles. Up to April, 55 per cent. of consumers of electric current were on the free list. The total subsidy required by the electrical industry to balance the budget of the current fiscal year (up to October 1st) is estimated in the report at 27,248,000 gold rubles, of which amount 12,787,000 rubles is needed for working funds and the remainder for industrial investments."

Lantern Slides.—Messrs. Tangyes, Ltd., Cornwall Works, Birmingham, have available for loan (free of charge) to engineering lecturers and technical instructors a large selection of lantern slides of their manufactures, also an assortment of slides of historical interest. A list of these will be sent on application.

A Dutch Manufacturing Company.—The report of the Netherlands High and Low Tension Apparatus (Hapam) Works Co., of Amsterdam, states that many difficulties arose in 1921 owing to the continued depression and the competition of countries having a depreciated currency. As a consequence it was impossible for the works, which is organised for production in bulk, to obtain sufficient orders to run at full capacity. Although the stocks were carefully valued in 1920, prices further declined last year, and thus exercised a great influence on the results, having regard to the large stocks on hand. In addition, the company had to meet its own contracts and accept the delivery of many goods which had to be placed in stock. As a consequence the results were not favourable, and after deducting the balance brought forward there was an uncovered amount of 24,000 florins on working account for 1921. The report adds that the turnover in the first half of 1922 was not very satisfactory, although the orders received in June showed progress.

Visit of Swedish Engineering Students.—Under the auspices of the Department of Overseas Trade a party of engineering students from the Technical High School, at Stockholm, have recently made a tour of this country. Among the works visited were those of Ferranti, Ltd., W. T. Glover, Ltd., the Metropolitan-Vickers Electrical Co., Ltd., at Manchester, and the turbine works of C. A. Parsons, Ltd., at Newcastle-on-Tyne.

South African Railway Construction Act.—His Majesty's Senior Trade Commissioner in South Africa (Mr. W. G. Wickham) has forwarded to the Department of Overseas Trade a copy of the Railway Construction Act, 1922. This has been introduced by the Minister of Railways and Harbours, and provides for the construction and equipment of certain lines of railway, the electrification of railways, the validation of certain rights, and the construction of certain deviations, &c. In conjunction with the above, H.M. Trade Commissioner has also forwarded a copy of a report of the Railways and Harbours Board on proposed new lines of railway, 1922. Engineers' reports and estimates of cost of construction, with a route map showing the projected railway, are attached in each case to the Board's report, to which, subjoined, will be found information showing the approximate length, the ruling grade, the weight of rails proposed to be used, the total estimated capital cost of construction, as well as the cost inclusive of rolling stock, and a statement in balance-sheet form of the probable revenue and expenditure for the first 12 months of working after the line has been opened for traffic. Copies of the above may be seen by United Kingdom firms on application to the Department of Overseas Trade (Enquiry Room), 35, Old Queen Street, Westminster, London, S.W.1. (Ref. 9088/ED/EP.)

An Argentine Directory.—The proprietors of the Argentine Standard Directory have notified the Commercial Secretary to H.M. Legation at Buenos Aires of their willingness to include in the 1923 edition of the Directory the names and addresses of British manufacturers who are not represented in Argentina but are desirous of receiving inquiries from that country. No charge will be made for the inclusion of names of firms who will be classified in the Directory under the headings of the goods they manufacture. British firms interested should communicate direct with the Standard Directory Co., Tucuman 692, Buenos Aires, Argentina.

Indian Railway Co.'s Extensions.—According to *The Englishman*, the Bengal-Nagpur has an extensive programme of improvements in hand. Four and a half lakhs of rupees has been set aside for the extension of the electricity generating plant at Khargpur, and one lakh of rupees for a similar purpose at Adra. Extensive developments are to take place at the Khargpur workshops within the next three years, as 22 lakhs of rupees is to be spent in improving the machinery and plant.—*Reuter's Trade Service* (Calcutta).

E.D.A. Activities.—The advantages of electric shop-window lighting as a "Silent Salesman" are set forth in a pamphlet recently published by the Association (E.D.A. 265). This advocates the illumination of windows after closing hours, utilising time switches. Another publication (E.D.A. 295) gives instructions regarding electric cooking by "Dorothy," an ordinary housewife—not a technical expert. This should prove useful to suppliers of electricity and electric cookers in extending the use of energy for this purpose.

Copper and Lead Prices.—Messrs. F. Smith & Co. report August 1st:—Copper (electrolytic bars), £72; 10s. increase. Do., do. (sheets), no change. Do., do. (wire rods), £82; 10s. increase. Do., do., h.c. wire, no change.

Messrs. James & Shakespeare report August 2nd:—Copper bars (best selected), sheet and rod, no change. English pig lead, £26 15s.; 5s. decrease.

The Engineers' Wages Reduction.—As briefly stated in our last issue, the members of the various engineering unions voted against acceptance of the employers' terms involving a reduction in wages of 16s. 6d. in three stages. Later it was announced that the vote of the Engineering and Shipbuilding Trades Federation was to the same effect, but as the majority against acceptance was less than two-thirds the men are to continue working. The result of the ballot was conveyed to the employers by the men's representatives on July 27th, and following this conference a statement was issued by Mr. J. T. Brownlie (A.E.U.) and the officials of the other unions concerned urging the men to remain at work, having regard to the state of trade and the widespread unemployment. The employers stated that if the proffered terms were not accepted they would have to consider making the reduction in one "cut."

It is also announced that the employés' opposition to systems of payment by results has recently undergone modification, so much so, that a meeting of the unions and the employers was to have taken place yesterday to discuss the general institution of the system.

Yorkshire Power Co.'s Coming-of-age.—To celebrate the 21st anniversary of the formation of the Yorkshire Electric Power Co. about 300 employés and their wives and friends were entertained to tea and a party at the Rectory Grounds, Thornhill, on July 27th. There were sports for the children and other entertainments. The officials and staff presented a solid silver tray to Mr. W. B. Woodhouse, engineer and manager to the company, and a solid silver rose bowl and flower and fruit stand to Mr. J. J. H. Stansfield, secretary, both of whom have been with the company for 19 years.

Manufacturing in Russia.—In connection with the movement which is on foot in Russia under the auspices of the Soviet Central Electrical Department for the reorganisation of the electrical manufacturing works (to which reference appears on page 160) one works suggested that it was necessary to make the country independent of imports of electrical machinery and plant, and that reorganisation could only be carried out by the scrapping of most of the producing plant in the works. At any rate, these statements were made in a recent issue of the Soviet newspaper *Ekon. Zjizn*, copies of which, a correspondent states, were placed at his disposal by Russian interests in London.

LIGHTING AND POWER NOTES.

Australia.—Bathurst (N.S.W.).—The Municipal Council has received a report from its consulting engineer formulating a scheme for the supply of electricity. The estimated cost is £37,000.

Newcastle (N.S.W.).—The annual report for 1921 of the municipal electrical engineer (Mr. G. Allbut) shows a total revenue of £100,258 and an expenditure of £86,246. The net result was a profit of £10,128. The number of units sold rose from 9,304,442 to 14,793,597. The City Council has decided to borrow £50,000 for additional electrical plant.—*Reuter's Trade Service* (Newcastle).

Bootle.—Transfer of Undertaking Approved.—The Electricity Commissioners have sanctioned the transfer of the electricity undertaking to the Liverpool Corporation.

Brighton.—Year's Working.—The accounts of the electricity undertaking (engineer: Mr. John Christie) for the year ended March 31st, 1922, record a total revenue of £206,213, as compared with £202,117 in the previous year. Working expenses increased to about the same extent, *viz.*, from £141,817 to £144,885, leaving a gross profit of £61,328 (£60,300). Capital charges were considerably less—£37,609, as against £48,441, giving a net result, after crediting bank interest, of £23,825 profit. The capital expenditure during the year amounted to £25,637, including an item of £15,813 for machinery and plant. The number of units sold increased from 11,261,408 to 11,408,093, and the maximum demand from 7,000 to 7,600 kW. The plant capacity is 12,500 kW.

Canterbury.—Loan Sanctioned.—The Town Council has received from the Electricity Commissioners sanction to a loan of £4,642 to complete payment for new plant at the electricity works.

Cheslyn Hay (Staffs).—Electricity Supply.—The Council has under consideration a proposal to supply the district with electricity.

Chester.—Year's Working.—The accounts for the year 1921-22 of the city electricity undertaking (engineer: Mr. S. E. Britton) show a total income of £50,278, comparing with a revenue of £47,716 in the preceding year. Working expenses absorbed £39,036, as against £33,838, reducing the gross profit to £11,242 from £13,878. Capital charges absorbed £10,439, leaving a net profit of £803. The amount of energy sold decreased from 3,717,802 to 3,539,560 kWh. The capital expenditure during the year totalled £47,787, the bulk of this being spent on machinery and cables.

Continental.—Ruthenia.—The *Gazette de Prague* says that a scheme is on foot, supported by the Slovak General Credit Bank, for the electrification of Ruthenia. The country is very rich in water power, so that the scheme should meet with success.—*Reuter's Trade Service* (Prague).

Spain.—The Sociedad Hidro-eléctrica Española hopes to put into operation shortly its works at the Dos Aguas Fall, which will relieve it of the necessity of employing coal at seasons of low water. This will represent a saving of about 45,000 tons of coal per annum. Several important hydro-electric companies have works of considerable extent in progress with the same object, and when all the works are completed the saving of coal may be estimated at at least 200,000 tons per annum.—*Reuter's Trade Service* (Madrid).

France.—The development of the supply system in Paris is making remarkable strides under the operation of the new d'Electricité and the municipality, which was brought into force last year. Although the consumption of energy for power purposes in 1921 experienced a decline as compared with the preceding year, owing to the industrial depression, the total sales advanced from 191,155,000 kWh in 1920 to 202,720,000 kWh last year, and in the early months of the present year the consumption showed an increase of 20 per cent. over the corresponding period in 1921. The work of raising the capacity of the stations from 120,000 to 240,000 kW has now been almost completed. These works represent only one stage, and a new programme of works has been submitted to the City Council

of Paris, which represents a supplementary financial expenditure of 300,000,000 fr. Among other matters it is found necessary to provide new sub-stations, increase the number of district offices, and, above all, make preparations for the unification of the network to a frequency of 50 periods, so as to enable the company to receive, if necessary, bulk supplies from other works.

Holland.—At a meeting of the Town Council of Dordrecht, held on July 11th, the proposal of the Mayor and Corporation to grant the concession for the supply of electricity to the municipality of Hoornaar was accepted. Plans have also been discussed for the electrification of the municipalities of Hoog Blokland, Arkel, Kodechem, Heukelon, and Asperen, and if these are carried out the total cost will be about gld. 345,000.

Belgium.—The Special Commission appointed by the Provincial Council of the Province of Liége in 1920 for the study of the distribution of electrical energy throughout the province has furnished a report, and makes a proposal that an intercommunal electrical co-operative society should be immediately constituted. H.M. Consul at Liége has furnished two copies of the above report, which can be consulted by United Kingdom firms interested on application to Room 49, Department of Overseas Trade, 35, Old Queen Street, Westminster, London, S.W.1. (Ref. 18,317/F.W./E.P.)

Russia.—It is stated in the *Izvestiya* that little has been done with electricity at the mines of the Donetz coal basin; in fact, only limited electrification or so-called "circuit" work, which consists in connecting up a system to some powerful station, with the simultaneous closure of other stations, has been carried out. It is hoped thus to have a large station of 70,000 kW in place of the present number of small stations now producing 95,000 kW. The total load on all existing stations is about 40,000 kW.

Croydon.—Hire of Domestic Appliances.—The Town Council has decided to expend £2,000 on electric cookers and motors to be let out on hire.

Dublin.—Water-power Scheme.—In connection with the scheme for the harnessing of the River Liffey to supply electrical energy to the city of Dublin, an inspection was made last week by representatives of the Free State Provisional Government, the Dublin Corporation, and Messrs. Buchi and Fey, of Zurich, consulting engineers, of the entire catchment area of the river and of the sites of the proposed electricity works. A dam is to be built, which will form a lake of 3,000 million cu. ft. capacity, which will provide sufficient power to supply all the electricity required for the city and district. The dam will be built about 200 yards above the walls of the Poulaphouca Valley, Co. Wicklow. The estimated cost of the scheme is about £1,000,000. The power stations suggested in the Water Power Committee's Report are at Poulaphouca, Ballymore Eustace, Salmon Leap, and Connell Ford, with subsidiary stations at Lockstown on King's River and at Cloghleagh. Storage will be needed above Poulaphouca and above Leixlip. The latter would be necessary both for peak loads and for daily regulation owing to the fact that the water allowed to flow down from Poulaphouca would only reach Leixlip about 20 hours later. Ballymore Eustace will be capable of dealing with a peak load of about 20,000 h.p., and Leixlip with a peak load of 10,000 h.p. These two stations will, however, be more than enough for the total present requirements of the city. As the demand develops, subsidiary stations will be put into operation.

Federated Malay States.—Singapore.—A report submitted by the electrical adviser to the Government states that although for some years the various areas of supply in Malaya will be isolated from each other, it is practically certain that all public supplies from Singapore to Penang will eventually be connected together to form one supply. The total cost of reconstructed and new installations to meet the full demands of the present population is put at 37,136,000 dollars and the power at 51,120 kW. This is for the whole country, including the Unfederated States. It is recommended that in Singapore a central power station should be erected to supply light and power to an area of about 30 square miles, replacing the present supplies which are obtained from the tramways and the Singapore Harbour Board. The system of supply would be a.c. 3-phase, with a frequency of 50 cycles. The e.h.p. transmission lines would be run at 22,000 or 33,000 V, and the supply to domestic consumers would be 240 V. For large power demands, electricity could be supplied at any intermediate pressure. The capital cost of the new and reorganised supply for Singapore is estimated at 5,167,000 dollars. It is estimated that a steam station of 7,500 kW could be installed, and, later on, as demands increased, extended to a capacity of about 12,500 kW, which, with additional transmission lines, sub-stations, feeders, distributors, and house services, would necessitate a further expenditure of 1,273,000 dollars, making a total capital cost of 6,440,000 dollars. It is estimated that within a few years the demand for electricity in Singapore will be about 8,700,000 kWh per annum for domestic use, &c., eventually rising to 23,400,000 kWh per annum.—*Reuter's Trade Service*, (Singapore).

Formby.—Electricity Supply.—The District Council is considering a scheme for supplying the district with electricity for both power and lighting. It is proposed to obtain the energy in bulk from the London & North-Western Railway Co.

Ipswich.—Year's Working.—The report of the chief engineer and manager of the municipal electricity undertaking for the year ended March 31st, 1922, shows a total income of £83,489, as compared with £90,854 in 1920-21. Working expenses totalled £55,481, as against £61,682 in the previous year, leaving a gross profit of £28,008 (£29,172). Capital charges absorbed £10,074 (£9,390), making the net result a profit of £17,934, as against £19,782. The capital account shows an expenditure of £46,106, the largest item being £23,145 for engines and dynamos. The sales of energy decreased from 5,464,955 to 4,906,830 units, and the maximum demand from 3,438 to 3,382 kW. During the year the second 3,000-kW Brush-Ljungström turbo-alternator was installed, and is now ready for use. A large amount of mains and feeder extensions were carried out.

Kingston-on-Thames. — Price Reductions.—The Town Council has reduced the maximum charge for electricity for general lighting from 9d. to 8d. per unit, and the 10 per cent. addition to the scale charges for electricity for power and heating has been removed.

Leek.—Loan.—The Urban District Council has decided to apply for a loan of £15,000 for new plant at the electricity works.

Liverpool.—Bulk Supply.—The Electricity Committee has recommended that an application be made to the Electricity Commissioners for an Order authorising the Corporation to furnish a supply of electricity in bulk to the Hightown Gas and Electricity Co., subject to the granting and confirmation of the Liverpool Electricity (Extension) Special Order, 1922.

Paisley.—Price Reductions.—It is proposed to reduce the charges for electricity for lighting by 1d. per unit and for heating by ½d. per unit.

Rochdale.—Street Lighting.—The Gas and Electricity Committee has adopted a scheme for the lighting of all the main streets of the borough by electricity, for which cable is to be laid at an estimated cost of £7,000.

Venezuela.—Electricity Scheme.—The City of Carupao is to install electrical plant on the Guarenas River, located at a point about 18 miles distant from Caracas, the capital. Electricity for both light and power will be generated up to a total of 2,500 h.p. The head of the fall is approximately 3,000 ft., and about 20 miles of transmission line will be required. The transmission pressure will be 35,000 V.—*Reuter's Trade Service* (Caracas).

Wrexham.—Loan.—The Town Council has applied for a loan of £1,570 in connection with the supply of electricity from Gresford Colliery.

TRAMWAY AND RAILWAY NOTES.

Australia.—Melbourne.—The Tramways Board is submitting for official sanction a scheme to construct an electric tramline traversing a portion of the centre of Melbourne. The estimated capital cost of the undertaking is £270,000. The policy of the Board with regard to the extra cars required was outlined in our last issue.

Sydney.—Work in connection with the city railway (a portion of which will travel underground) will shortly be proceeded with. Reports prepared show that nearly £1,000,000 has been spent already on the project. The Ministry of Railways has stated:—"The City Railway must be proceeded with and brought to completion at the earliest date possible. Traffic is increasing at the rate of 10 to 12 per cent. per annum, and the present tracks are at the limit of their capacity."—*Reuter's Trade Service* (Melbourne).

Cardiff.—New Electric 'Buses.—The Finance Committee has authorised the expenditure of £13,000 on the acquisition of eight new electric motor omnibuses.

Dutch East Indies. — Railway Electrification. — The Government of the Dutch East Indies has decided to convert all the railways in Java to electric traction. Two power stations are to be erected for this purpose at distances of 39 and 27 miles respectively from Batavia. The reconstruction of the line between Meester-Cornelis and Tandjong-Priok is first to be put in hand, and it is hoped to be able to start work on this line next year.

Fife.—New Track.—The Fife Tramways Co. is to construct a tramway line from Rosyth to Inverkeithing.

Ipswich.—Year's Working.—The accounts of the borough tramway undertaking for the year ended March 31st last record a total revenue of £44,528, as compared with £50,341 in the previous year. The expenditure amounted to £44,735, as against £51,942, resulting in a gross deficit of £207 (£1,601). This was increased by capital charges to £4,596 net, which, however, compares favourably with the previous year's deficit of £5,163. The number of car miles run declined from 652,420 to 550,703, and the number of passengers carried from 6,170,242 to 5,552,849.

London.—Ticket-issuing Machine.—The Metropolitan Electric Tramways, Ltd., are introducing an automatic ticket-issuing machine on the new type of tramcars in course of construction.

The exits from the cars, both from the upper and lower decks, will be separate from the entrances, and the doors will be automatically controlled. It is also proposed to provide duplicate ticket-issuing machines at certain points on the route to facilitate travelling during the busy hours.

Newcastle-on-Tyne.—Light Railway.—The City Corporation has received the sanction of the Light Railway Commissioners to construct a line through Gosforth Park, which will connect the Westmoor extension of the City system with the Gosforth Park section of the Tyneside Tramways and Tramroads Co., over which the municipality has already running powers. The track through the park will be on sleepers, and will consist of a double line. The estimated cost of the scheme is £50,000.

Salford.—Track Renewals.—The Tramways Committee has recommended the Council to apply for sanction to borrow £39,500 for relaying parts of the tramway track in Eccles New Road and Eccles Old Road.

TELEGRAPH AND TELEPHONE NOTES.

Esthonia.—Telephone Development.—The telephone system of Esthonia, inherited from the Russian *régime*, is so antiquated that extensive betterments are becoming imperative, states a report published by the U.S. Department of Commerce. Except the private lines of the Soviet Mission, which connect with Petrograd, the only connection with other countries is the submarine cable to Helsingfors; trunk lines throughout the country are so scarce that long-distance calls are seldom made, says the *Financier*. Not only is line construction contemplated, but an entirely new central plant must be installed. The number of subscribers could be tripled at once if equipment were adequate, and a switchboard of 25,000 lines is under discussion. The chief engineer is now making an investigation in Germany, Belgium and Sweden to determine whether a manual, automatic or semi-automatic board will be purchased, as well as other modern devices. The Siemens Co. has sent representatives from Germany with a small model automatic system. Development in Reval was delayed because pre-war rates were four or five times as high as in Finland. There are at present only 2,000 subscribers, all on single lines, in this city of nearly 130,000 inhabitants; but this number will shortly be increased to 3,000. The annual basic rates are 4,000 Esthonian marks for residence and 8,000 Esthonian marks for a business 'phone, plus 1 mark per call from each. The latter surcharge was recently added in an attempt to make the system more self-supporting. At present the central office equipment is old Russian, cables are German, connecting wires Swedish, and instruments and miscellaneous equipment are from the Esthonian factory in Dorpat. The few underground cables are not laid in conduits, and the cost of locating and repairing is so great that concrete conduits must be laid.

Ireland.—Wireless Station Destroyed.—The Marconi wireless station at Clifden, Co. Galway, was destroyed by "irregulars" on July 25th. The receiving station was burned down and the condenser house bombed. The station was connected with London by a land line, and its chief use was for communicating with Canada, which service is now being worked from the new Marconi station at North Weald, near Ongar, in Essex, which also maintains services to France, Switzerland, and Spain. The Clifden station was opened on October 7th, 1907, and the corresponding Canadian station was at Glace Bay, Nova Scotia. It was manned by 25 operators, 10 engineers, and about 50 general staff; and, in addition, as a side line, big peat works gave employment to a large number of people, so that the living of not less than 1,000 people depended upon it.

Italy.—Transmarine Cable Scheme.—A Royal decree has been published in Madrid ratifying the text of the concession, approved by the Council of Ministers and granted by the Spanish Government to the Italian Submarine Cable Co., which proposes to establish cables between Italy and South America. The concession authorises the company to create two landing places at Malaga and Las Palmas respectively, and to erect and work receiving and transmitting stations.

Wireless Apparatus.—A prize competition of 100,000 lire has been instituted by the Italian Ministro della Guerra for the invention, by an Italian, of a wireless telephone specially suitable for use during intense operations in the field of war. The power of the apparatus is fixed at 2 kW, at least; secrecy of messages sent, capability of being used by non-technical individuals, ease of repair, and other qualifications are stipulated. The designs must be submitted within a period of two years.

Philippines.—Broadcasting.—A broadcasting wireless service has been established in the Philippine Islands by an American manufacturing concern. The range is 600 miles, and both telephone and telegraph messages will be transmitted broadcast daily.—*T. & T. Age.*

Uruguay.—Telegraph Developments.—The Executive Council will shortly consider a project for considerably extending the State telegraph system; an internal loan of 1,000,000 pesos will be issued for the purpose.—*Financial Times.*

Wireless Telegraphy.—Broadcasting.—The six companies which are to have control of the British wireless broadcasting stations are the Metropolitan-Vickers Electrical, the General Electric, the Western Electric, the Radio Communication, the B.T.H., and the Marconi companies. The Postmaster-General's meetings with the representatives of the wireless distributing companies have been satisfactory, and the companies will now get to work in earnest.—*Daily Mail.*

CONTRACTS OPEN AND CLOSED.

(The date given in parentheses at the end of the paragraph indicates the issue of the Electrical Review *in which the "Official Notice" appeared.)*

OPEN.

Australia.—Melbourne.—October 17th. Postmaster-General's Department. Automatic c.b. telephone equipment, with all associated equipment including material for use at subscribers' premises. (Sched. 39 and 40.) (July 7th.)

September 27th. Telephone apparatus and parts. (Sched. 561.) (July 14th.)

Victorian Electricity Commission.—Ten surface feed-water heaters; 6 surface vapour condensers; 12 feed-water evaporators. Specifications £2 2s. Particulars from Agent-General for Victoria, Melbourne Place, Strand, W.C.2.

September 13th. Tramways Board. Twenty-seven straight air-brake equipments for single-truck tramcars.

December 18th. Victorian Electricity Commissioners. Supply of a complete brown coal-handling plant.—*Reuter's Trade Service* (Melbourne).

Brisbane.—September 20th. Postmaster-General's Department. Supply and delivery of switchboard apparatus and parts. (Sched. No. 559.)*

Belgium.—August 16th. Administration des Télégraphes et Téléphones, La Salle Madeleine, Brussels, 120 tons of copper wire, 1-4 mm. dia., having a conductivity of 30 per cent.; 40 tons of ditto, with 80 per cent. conductivity; and 40 tons 2 mm. dia. and 80 per cent. conductivity.

August 2nd. Municipal authorities of Schaerbeek, Brussels. 10,500 metres of armoured l.p. cable and 3,000 metres ditto for h.p. mains. Service de l'Electricité, Hotel Communal, Schaerbeek.

Commandant des Bâtiments Militaires de Liége-Rive Droite, 22, Rue des Bonnes Villes, Liége. Generator for the electric lighting station at the military sanatorium at Marchin.

Edinburgh.—September 5th, Corporation. Conversion of two overhead cranes from mechanical to electrical operation. (See this issue.)

Manchester.—August 8th. Electric lighting of portion of Monsall Hospital. City architect, Town Hall, Manchester.

August 24th. Electricity Committee. Two steel ash wagons and a lifting sling. (See this issue.)

August 8th. Tramways Department. Single-deck petrol omnibus; steel tramway poles. General manager, 55, Piccadilly, Manchester.

New Zealand.—October 24th. Mangahao Power Scheme. Copper wire. November 21st. Battery booster-transformer. Specifications may be obtained from the office of the High Commissioner.

October 3rd. Mangahao Power Scheme. Power-house and sub-station transformers; travelling electric cranes; ventilating fans; goods lift; and 110,000-V insulators.*

September 30th. Teviot Electric Power Board. One horizontal turbine, Francis type, coupled to a 125-kW, 3-phase, 50-cycle, 3,300-V generator; one 7.5-h.p. Pelton wheel; one 5-kW motor generator set; and complete switchboard and power station equipment.*

Nelson.—September 21st. The Waimea Electric Supply and Manufacturing Co., Richmond, Nelson. Supply of a 150-kVA, 2,500-volt generator and control panels.

Wellington.—City Council. Erection of a large reinforced concrete power station at Shag Point.—*Reuter's Trade Service* (Melbourne).

Oxford.—August 15th. Oxford Electric Co., Ltd. One 1,000-kW turbo-alternator and condensing plant; and one 500-kW conversion plant (3,000 V, 3-phase, to 1,100 V. d.c.), complete with switchgear. (July 21st.)

Rhondda.—Urban District Council. Two 3-in. and two 6-in. vertical-spindle centrifugal pumps, together with electric motors. Also two cast-iron tanks in connection with the pumps. Specifications (£1 1s.) from Mr. E. Taylor, engineer and surveyor, Rhondda Urban District Council Offices, Pentre, Rhondda.

Rochdale.—August 16th. Union. Installation of automatic telephone system at Dearnley Institution. (See this issue.)

South Africa.—Grahamstown.—September 1st. Electric lighting plant and equipment, comprising steel poles, overhead wiring, house services, fuses, transformer switches, meters, street lamps, &c. Consulting engineer: Prof. W. Buchanan, 75, Louis Botha Avenue, Houghton Estate, Johannesburg.*

Pretoria.—August 17th. Municipality. Supply and delivery of 950 steel poles for the Tramway Department.*

Tasmania.—Hobart.—October 2nd. City Council. 750-kW rotary converter and transformer and 550-volt, d.c. switchboard panel. Further particulars are due to arrive at the office of the Agent-General for Tasmania, Australia House, Strand, London, W.C.2, about the middle of August.

Warrington.—August 14th. Electricity and Tramways Committee. High and low-pressure paper and lead-covered cable, and earthenware conduits. (July 28th.)

Wimbledon.—August 31st. Electricity Committee. One 3,000-kW turbo-alternator, condensing plant, and accessories. (July 28th.)

*A copy of the plan, specifications, and conditions of tender, &c., can be inspected at the Department of Overseas Trade (Room 84), 35, Old Queen Street, S.W.1.

CLOSED.

Glasgow.—Tramways Committee. Recommended:—
D.c.c. wire.—British Insulated & Helsby Cables, Ltd.
Steel for tie bars.—P. & W. MacLellan, Ltd., and Smith & McLean, Ltd.
Air compressor for Dalhousie sub-station.—Fleming & Co.
Cast-iron exhaust piping for Pinkston.—Macfarlane, Strang & Co., Ltd.
Brass tubing for cars.—C. Henderson & Co., Ltd.

Government Contracts.—The following Government contracts were placed during June, 1922:—

Admiralty (Contract and Purchase Department).
Submarine batteries.—Hart Accumulator Co., Ltd.; Tudor Accumulator Co., Ltd.; D.P. Battery Co., Ltd.; Chloride Electrical Storage Co., Ltd.

Air Ministry.
Accumulators.—Peto & Radford.
Electrical material.—General Electric Co., Ltd.
Electrical equipment of Lancia cars.—S. Smith & Sons (M.A.), Ltd.

Crown Agents for the Colonies.
Cells.—J. Stone & Co., Ltd.
Electrical equipment.—Siemens Bros. & Co., Ltd
Electrical instruments.—Railway Signal Co., Ltd.
Motors and control gear.—Lancashire Dynamo & Motor Co., Ltd., associated with the Crypto Electrical Co., Ltd.
Train lighting spares.—J. Stone & Co., Ltd.; Vickers, Ltd.

Post Office.
Telephone apparatus.—British L.M. Ericsson Manufacturing Co., Ltd.; Siemens Bros. & Co., Ltd.
Testing, protective apparatus, &c.—Morgan Crucible Co., Ltd.; Phœnix Telephone and Electric Works, Ltd.; Siemens Bros. & Co., Ltd.
Telegraph and telephone cable.—Connolly's (Blackley), Ltd.; Enfield Ediswan Cable Works, Ltd.; Hackbridge Cable Co., Ltd.; Macintosh Cable Co., Ltd.; Pirelli-General Cable Works, Ltd.; Union Cable Co., Ltd.; Western Electric Co., Ltd.
Compound.—W. H. Keys, Ltd.
Loading coils.—Western Electric Co., Ltd.
Cords for telephones.—British Insulated & Helsby Cables, Ltd.
Ducts.—Albion Clay Co., Ltd.; Doulton & Co., Ltd.; G. Jennings; J. Oakes & Co. (Clayworks Department); Sutton & Co. (Overseal), Ltd.; Stanley Bros., Ltd.; J. H. Turner & Lisney, Ltd.
Insulators.—J. Bourne & Son.
Lead (sheet and strip).—G. Farmiloe & Sons.
Lead lugs.—I. N. Lyons, Ltd.
Jointing sleeves.—Dugard Bros., Ltd.
Thermionic valves.—General Electric Co., Ltd.; Marconi Wireless Telegraph Co., Ltd.
V.i.r. wire and cable.—Hackbridge Cable Co., Ltd.
Laying conduits.—Numerous contracts have been placed during the month.
Telephone exchange equipment.—Darlington: Western Electric Co., Ltd. Epsom: Automatic Telephone Manufacturing Co., Ltd.

H.M. Office of Works.
Converter set.—General Electric Co., Ltd.

Ilford.—The Urban Council has decided to accept a tender from a British firm supplying Belgian material for tram rails and fishplates, this being the lowest quotation. The difference in the tenders was £9 a ton for Belgian material, and £12 for British, and the total saving on the contract by accepting the lowest tender is £150.

Liverpool.—Electricity Committee. Recommended:—
The erection of an electric sub-station in Bull Lane, Aintree (£1,206).—Joshua Henshaw & Sons, Liverpool.

London.—St. Pancras.—Electricity Committee.
Conversion of Grafton Road Chapel into an electricity sub-station (£4,221).—National Building Guild, Ltd. (recommended).

Cable for the supply of electric power to Messrs. Hulton's premises in Gray's Inn Road:—

Macintosh Cable Co., Ltd.	£16,499
Electrical Supplies Co.	15,458
Callender's Cable & Construction Co., Ltd.	14,679
Enfield Ediswan Cable Works, Ltd.	14,351
Watsham's	14,291
Pirelli-General Cable Works, Ltd.	14,225
Hackbridge Cable Co., Ltd.	14,205
W. T. Glover & Co., Ltd.	14,045
W. T. Henley's Telegraph Works Co., Ltd.	13,906
Siemens Bros. & Co., Ltd.	13,743
British Insulated & Helsby Cables, Ltd.	13,657
Western Electric Co., Ltd. (recommended)	13,634
Johnson & Phillips, Ltd.	13,533
Union Cable Co., Ltd.	13,389

Closed-circuit boiler-feed and water-testing apparatus at King's Road Station (£1,415).—Weir & Co. (recommended).

Coal for the electricity station. Accepted:—
500 tons Cadby Hall nutty slack, 22s. 5d. per ton; 500 tons Ramcroft 1½ in. nutty slack, 22s. 11d. per ton; 500 tons Pinxton low main nutty slack, 22s. 11d. per ton; 500 tons Pinxton low main ½ in. nutty slack, 19s. 5d. per ton; 500 tons Bentinck nutty slack, 24s. 3d. per ton; 500 tons Fenton 2 in. nutty slack, 21s. 5d. per ton.—J. H. Beattie & Co., Ltd.
200 tons Russell black vein washed nuts, 35s. per ton, plus 2s. 9d. ton cartage.—Harper & Christopher.
100 tons Ramcroft large, 33s. per ton.—J. H. Beattie & Co., Ltd.

L.C.C.—Highways Committee.
Steel rolling shutters for the Central Tramway Repair Depôt (£1,790).—Wilson Rolling Shutter Co. (accepted).

Three-phase motors, &c., for the central repair depôt extension:—

Crompton & Co., Ltd. (accepted)	**£1,016**
General Electric Co., Ltd.	1,019
Metropolitan-Vickers Electrical Co., Ltd.	1,117
Lancashire Dynamo and Motor Co., Ltd.	1,149
Electric Construction Co., Ltd.	1,166
Bruce Peebles & Co., Ltd.	1,186

Erection of a trailer car shed at Brixton Hill.—L. H. & R. Roberts, £14,986, plus £1,064 for boarded and slate covered roof coverings instead of galvanised iron (accepted).

Metropolitan Asylums Board.—Installation of internal automatic telephones at River Hospitals:—

T. Clarke & Co., Ltd. (recommended)	**£4,600**
Reliance Telephone Co., Ltd.	4,996
Automatic Telephone Manufacturing Co., Ltd.	6,134
E. Shipton & Co.	6,600
Electrical Contracts & Maintenance Co., Ltd.	6,800
Commercial Telephone & Electrical Co., Ltd.	6,897
F. G. Howard, Ltd.	7,944

Installation of electric lighting in ward blocks, &c., Grove Hospital:—

E. Beckwith & Co., Ltd. (recommended)	**£1,431**
Scottish Power & Electric Contracting Co.	1,532
S. Reed & Sons	1,590
Malcolm & Allan, Ltd.	1,826
J. Briggs & Co.	1,872
A. F. Goodwin & Co.	1,885
D. Henderson	1,975
G. Hopkins & Sons (Clerkenwell), Ltd.	2,050
Myall Bros.	2,078
T. H. Smerdon	2,333
Rawlings Bros., Ltd.	2,335
Keeble (1914), Ltd.	2,375
Toy & Winslow	2,500
S. G. Cozens & Co.	2,750
F. G. Howard, Ltd.	3,878
Hill, Upton & Co.	4,239

Loggerhead (Cheshire).
Electric lighting installation at the Burntwood Sanatorium.—Carrington and Button, Crewe.

Luton.—Town Council. Accepted:—.
2,000-kW transformers (£2,303).—Brush Electrical Engineering Co., Ltd.

Manchester.—Education Committee. Accepted.
Electric lighting of schools:—Mulberry Street school, Maitland & Co.; Southall Street do., Seddon & Sons; Duke Street do., Alliance Electric Co.; Johnson Street do., Building Guild, Ltd.; Waterloo Road do., Power and Lighting Supplies Co., Ltd.; Sunnyside do., Ward & Booth.

Electricity Committee. Accepted. (Barton Works):—
Three electrical distance indicating thermometers.—Siemens Bros. & Co., Ltd.
Two electrical distance recording thermometers.—Cambridge & Paul Instrument Co., Ltd.
Ventilating plant for transformer and testing chambers.—Matthews and Yates, Ltd.; sub-contractors for switchgear, Midland Electrical Manufacturing Co.; for auto-transformers, Ferranti, Ltd.
Cables.—Callender's Cable & Construction Co., Ltd.
Capstans and bollards.—Sir W. G. Armstrong, Whitworth & Co., Ltd.; sub-contractors for motors, Lancashire Dynamo and Motor Co., Ltd.; for control gear, E. Holme & Co., Ltd.
Main and switch house batteries.—Chloride Electrical Storage Co., Ltd.

Housing Special Committee. Accepted:—
Installation of electric light at houses on the Catterick Hall, Newton Heath, and Gorton Mount Estates.—E. M. Evans & Sons.

Reigate.—Town Council. Accepted:—
Overhead travelling crane (£1,234).—Carrick & Ritchie.
Oil tanks (£1,050).—Oxley Bros.
Dismantling, reassembling, and refixing existing cast-iron water tank (£251 5s. 7d.).—Tamplin & Makovski, Ltd.
Diesel engines and alternators.—Mirrlees, Bickerton & Day.

Salford.—Electricity Committee.
Switchgear, &c., required in connection with the new generating station at Agecroft (£56,506).—Metropolitan-Vickers Electrical Co., Ltd. (Recommended.)
L.p. lead-covered cable (£1,880).—W. T. Glover & Co., Ltd. (Accepted.)
One 500-kVA transformer (£505).—Metropolitan-Vickers Electrical Co., Ltd. (Accepted.)

Tramways Committee.
One low-built tramcar (£2,158).—Brush Electrical Engineering Co., Ltd. (Accepted.)

THE "ELECTRICAL REVIEW" SERVICE DEPARTMENT.

To enable us to complete replies to queries received this week, we need the names of suppliers or manufacturers of:—

The Lester dynamo.

Wireless on Aircraft.—The International Commission on Air Navigation has decided that in the interests of public safety all aeroplanes must be fitted with a wireless installation.—*The Times.*

NOTES.

Reduction of Electricians' Wages.—We learn from the president of the Electrical Contractors' Association (Mr. H. Marryat) that at a meeting held in York on July 27th between the executives of the N.F.E.A. and the E.T.U., an agreement was arrived at by which a reduction of electricians' wages will take place in two stages, 5 per cent. on the second pay day in October, and a further 5 per cent. on the second pay day in December. The agreement has been confirmed by the National Joint Industrial Council. It was suggested by the employers that wages should only be reduced in districts where the wages of electricians in other branches of the industry were lower than those in the contracting branch, but the proposal did not meet with the approval of the E.T.U. representatives. Other matters decided at the conference were the down-grading of Southampton and Belfast to Grade "C," and the retention of Bournemouth and Cambridge County in their present grades.

Appointments Vacant.—Meter tester for Wolverhampton Electrical Engineer's Department; demonstrator in the Electrical Engineering Laboratory, for the East Ham Technical College; engineer for the testing and calibration of switchgear instruments, &c. (75s. and bonus), for the L.C.C. Tramways Department. (See our advertisement pages to-day.)

British Engineering Standards Association.—The B.S.S. No. 96-1922 for "Parallel sided carbon brushes for d.c. commutator machines" has just been issued. After a great deal of consideration by the committee responsible for its preparation, it was decided to standardise only sizes of brushes for d.c. machines in the first instance. The specification is divided into two sections referring to carbon and metal-carbon brushes and compressed unburnt graphite brushes respectively, for which nominal dimensions and permissible tolerances are specified.

Wireless Developments.—An invention likely to cause a revolutionary change in wireless long-distance work has been made by Dr. Irving Langmuir, the world-famous physicist. Senatore Marconi recently paid a visit to Dr. Langmuir's laboratory to see it at work. It is a simple tube for the generation of powerful wireless currents, and its possibilities are such that it may "scrap every big plant in existence when fully developed." Mr. Marconi has himself recently predicted that to-day's equipment will be obsolete ten years hence.

A method of wireless telephony that has been used between Moscow and Berlin (over 1,000 miles) with success and is stated to give remarkably true rendering of the human voice is known as the Pungs-Gerth system. Its chief feature is the novel way in which the microphone currents are made to influence the currents radiated from the antenna by a new magnetic device giving great purity of tone and distinct speech reproduction.

Further progress has been made in the automatic recording of wireless messages, in the shape of a new apparatus which allows of two messages of nearly equal wave-length being simultaneously registered in the operator's absence. Despite the sensitiveness of the device—which is the work of Mr. F. W. Dunmore, of the American Bureau of Standards—it can be used to record messages on an aeroplane, being proof against vibration.

A remarkable new receiving apparatus, invented by Major E. H. Armstrong, is stated to amplify wireless impulses more than a hundred thousand times, and to be many hundreds of times more sensitive than the best heterodyne receiver. It has been recently described at the American Institute of Radio Engineers, and has caused intense interest. Much depends upon the evolution of the receiving apparatus in long-distance wireless; the more sensitive that it can be made, the less power will be required for transmission.

One of the most remarkable developments in wireless broadcasting is the extensive transmission of time signals. Started in 1909 by the Eiffel Tower, the sending of time signals is now a feature of over forty of the world's chief wireless stations. They are sent out on widely varying wave-lengths and systems. The familiar time signals of the Eiffel Tower make it easy with a little practice to register the correct time to within a half to a quarter of a second.—*Daily Mail.*

Fatality.—On July 24th Tudor Williams, assistant electrician at Blaencaegurwen Colliery, South Wales, and an international footballer, was killed by an electric shock. It appears that while examining a cable at the colliery he accidentally came into contact with a current-carrying wire.

A Wireless Telephony Experiment.—One of the receiving stations arranged for the much-advertised *Daily Mail* wireless concert from The Hague was at the offices of a well-known London electrical firm. On the appointed evening a large audience had assembled before the scheduled time. Seven o'clock arrived, but the loud-speaking apparatus which had been set up remained dumb, and it was apparent that something was wrong. Whether it was the inadequacy of the transmitting power (800 watts) or whether atmospherics and Croydon were to blame, the fact remains that a large crowd was disappointed. An attempt to mitigate their chagrin was made by the running over of a few gramophone records, and, later, by a wireless concert from a nearer source. The first was rather nerve-racking, and the second was reminiscent of the earliest of phonographs. No doubt better success will attend later efforts, but in the meantime it will be better, both for "wireless" and the public, if audiences are not summoned together to be experimented upon.

It is only fair to say that in several places The Hague concert was received—these places being chiefly upon the East Coast.

American Electric Railway Association's Convention.—The American Electric Railway Association, comprising nearly 600 railway and manufacturing companies, will hold its forty-first annual convention at Chicago from October 2nd to 6th, simultaneously with the conventions of its subsidiary organisations, the Engineering, Transportation, Manufacturers', Accountants', and Claims Associations. Large city and interurban passenger cars, motor 'buses, and machinery of various sorts will be exhibited. The electric railways of the United States and Canada represent an investment of about $5,000,000,000.—*Reuter's Trade Service* (Chicago).

The Salaries of Municipal Electrical Engineers in Scotland.—The action which has been taken by municipal authorities in several places regarding the salaries of chief electrical engineers has been reported in our "Personal" columns during the last few weeks. One of the most prominent cases has been that of Dundee, and it arose when the appointment of a successor to Mr. H. Richardson was receiving attention. A similar subject was last week under discussion at a meeting of the Edinburgh Town Council, when, according to the *Dundee Courier*, Mr. Stevenson moved that the Council accept the recommendation of the Electricity Committee to withdraw from the National Joint Board. Mr. Stevenson quoted the salaries paid to the employés in the electrical undertaking before the war, and compared them with the largely increased salaries paid under the Government scheme which set up the National Joint Board. Mr. Mancor, in seconding, said that if they were going to carry on such a large and costly undertaking as the electric power station at Portobello they could not afford to be burdened with such high salaries as they would be saddled with under the scale of this Joint Board. Mr. Guest, vice-convener of the Electricity Committee, said all he wanted was that this matter should be delayed till they saw the revised schedule of salaries which was to be put forward by the Joint Board. Judge Robertson said what they had to decide was whether the Town Council should settle the remuneration to its own servants or leave it to outsiders. Under the schedule of this Joint Board they found men receiving 100 per cent. more than their previous maximum, which was far more than the Town Council gave to any of its other officials. On a vote, Mr. Stevenson's motion was carried by 33 votes to 17.

The decision of Edinburgh has been followed with great interest at Dundee, as may be gathered from the following editorial comment appearing in the *Dundee Courier*: "Dundee Corporation should note for their encouragement the action taken by Edinburgh Town Council. That body decided to withdraw from the National Joint Board, which was set up under a Government scheme, and which requires them to pay the officials in their electricity department salaries which the Council consider excessive. The Dundee authorities have been somewhat taken aback by the refusal as inadequate of the salary they offered to a prospective new electrical engineer for the city. And there have been comparisons with other towns, and some misgivings as to whether they would get a competent official at their own figure. Let Edinburgh's example strengthen them in the determination to stick to their own estimate of what is fair remuneration for their officials."

The New Magnetic Atom.—In order to improve his original theory of magnetic induction in ferromagnetic materials, Sir J. A. Ewing published in February his theory that the magnetic element is not the atom itself but something smaller, which can rotate within the atom. It may be likened to a wheel with a number of like poles on its rim and the poles of opposite kind at its centre. Around it is a fixed ring provided with magnetic poles, under the action of which the wheel may take up a number of positions of equilibrium. Two months later Prof. E. T. Whittaker showed that a model of this type, when approched by an electron with kinetic energy exceeding a certain amount U, would take from it an amount U depending on the electronic charge and on the constants of the model, and that if n is the frequency of the oscillations of the model and of the radiation it emits, then $U = hn$ where h is the constant of the quantum theory. More recently Dr. H. S. Allen has pointed out that such a vibrator would not lead to the equi-partition law, and Dr. R. A. Houston has shown that for the model to vibrate with the frequency of sodium light its diameter must be 2.7×10^{-8} cm. and with its X-ray frequency 3.5×10^{-10} cm., which agree well with the known diameter, 2×10^{-8} cm. of the hydrogen atom. The four papers mentioned will be found in the *Proceedings* of the Royal Society of Edinburgh. —*Nature.*

South-East Lancashire (Interim) Electricity Advisory Board.—The Electricity Commissioners have published a draft order establishing the above Board, which, it is anticipated, will shortly be made by the Ministry of Transport, upon which the Board will become a statutory body vested with the powers conferred upon it by the Order. In the meantime matters have reached an advanced stage in the South-East Lancashire area. The whole of the constituent authorities have voluntarily agreed to set up an Interim Board and to act in relation thereto in all respects as though the Order was actually in force. Moreover, the Commissioners have also agreed to refer to the Interim Board all matters which would have to be referred to the Board if the Order was in actual operation. The Interim Board held its first meeting on July 11th, and appointed Alderman W. T. Dagnall (chairman of the Manchester Corporation Electricity Committee) who has been chairman of the Conference during the past two years, to the chairmanship of the Board. Dr. H. F. Parshall was appointed vice-chairman. In pursuance of the Order the Board at its first meeting appointed an Engineering Advisory Committee, consisting of the following members:—

Undertakings Generating more than 5 per cent.: Mr. S. L. Pearce (Manchester), Mr. C. D. Taite (Lancashire Electric Power Co.), Mr. J. J. H. Wood (Bolton), Mr. J. A. Robertson (Salford).

Undertakings Generating more than 3 per cent., but not more than 5 per cent.: Mr. F. L. Ogden (Oldham), Mr. B. Lomax (Stockport).

Undertakings Generating more than 1.5 per cent., but not more than 3 per cent.: Mr. R. Owen (Wigan).

Undertakings Generating not more than 1.5 per cent.: Mr. G. H. Faweus.

Stalybridge, &c., Board (Qualified Membership): Mr. R. Blackmore.

Railways, North-Western, Midland, and West Scottish Group: Mr. C. W. Neele. (Co-opted.)

Railways, North-Eastern, Eastern, and East Scottish Group: Lieut.-Col. H. E. O'Brien. (Co-opted.)

This election was made from nominations made by the constituent authorities. The Engineering Advisory Committee has appointed as chairman Mr. S. L. Pearce, C.B.E., M.Sc., chief engineer and manager of the Manchester Corporation Electricity Department, and Mr. C. D. Taite, of the Lancashire Electric Power Co., vice-chairman. Both the Interim Board and the Engineering Advisory Committee are now meeting and transacting business as though the Order had been approved by Parliament, and the constituent authorities have great confidence in the future success of the Board.

Iron and Steel Institute.—The annual autumn meeting of the Institute (president: Dr. J. E. Stead, F.R.S.) will be held by kind permission of the Yorkshire Philosophical Society in the Museum Theatre, York, in September. Members will assemble at York on Monday, September 5th; on the Tuesday the Lord Mayor of York, Ald. W. H. Birch, will welcome the visitors, and the day will be devoted to the reading and discussion of papers. During the afternoon Mr. W. McConway, of Pittsburg, will give a film demonstration of the new process of producing steel disks by centrifugal-hydraulic methods direct from molten steel. On the Wednesday morning more papers will be read and discussed; in the afternoon there will be a garden party and visits to mediæval and other buildings in and around the beautiful grounds of the Yorkshire Philosophical Society; and in the evening a conversazione will be held. On the Thursday a visit will be paid to the Devonshire works of the Staveley Coal & Iron Co., Ltd., near Chesterfield. In the afternoon there will be a charabanc excursion, and members will dine together informally in the evening. On Sepember 8th, the last day of the meeting, the works of the Parkgate Iron and Steel Co., Ltd., will be visited. Amongst the papers to be read is one by Messrs. E. D. Campbell and — Johnson, being "A Preliminary Magnetic Study of Some Heat-treated Carbon Steels," and another by Mr. G. A. V. Russell on "Reversing Cogging Mills: Their Drives and Auxiliary Equipment."

Ealing and the Electricity Commissioners.—The Chairman of the Ealing Electricity Supply Committee has presented a report to the Council upon the facts of the recent litigation regarding the taking of a bulk supply of electricity, in which the Council has been involved. The discharge of a rule *nisi* obtained against the Electricity Commissioners was reported in our last issue, and the earlier proceedings in the Electrical Review of June 2nd last.

The report states that in accordance with the directions of the Commissioners the Ealing Town Council sought terms for a bulk supply from the Metropolitan Electric Supply Co., Ltd., which quoted a price of £4 10s. per kVA of maximum demand per annum, plus .5d. per unit, subject to variation by a "coal clause." As the offer was considered unsatisfactory the Hammersmith Borough Council was approached, and, according to the report, quoted terms which, as compared with the Supply Co.'s offer, represented a saving to the Ealing Council of £7,000 a year for the first three years, and £3,000 a year thereafter. The Electricity Commissioners did not agree with these figures, but on their own showing the Hammersmith supply would have been given at a lower price per unit (.167d. lower) than the company's supply, and this represented an annual saving of £2,087, which was so serious a difference that it merited every consideration. Nevertheless the Commissioners declined to depart from their predetermined plan, supplying, says the report, "a very significant commentary upon the object of the Act of 1919, 'to provide or secure the provision of a cheap and abundant supply of electricity.'"

Since the legal proceedings the cost of the production of electricity at Hammersmith has been considerably reduced, and under the proposed scheme, which was one of co-partnership, Ealing would have benefited to a large extent. The report concludes as follows: "The policy of the Commissioners appears to be to give commercial undertakings carried on by undertakers, such as the Metropolitan Electric Supply Co., every possible benefit at the expense of undertakings carried on by local authorities for the benefit of those who reside in their areas and are supplied with electricity at what amounts to the actual cost of generating and distributing, plus the cost of capital charges, as compared with the object of the company to pay the best possible dividends to its shareholders. It is a very serious matter to all local authorities that their freedom should be fettered in such an unjust manner as indicated by the foregoing facts."

Institute of Transport.—Among the papers arranged for the ensuing session is one by Sir Philip Dawson, M.P., on "The Investigation of the Return on Capital Expenditure resulting from Electrification." The meetings, which commence on November 6th, are to be held at the Institution of Electrical Engineers.

Adhesives Research Committee.—The first report of the above-named Committee has been published by H.M. Stationery Office (Cornwall House, Stamford Street, S.E.1; price 4s. net). It embodies the results of certain of the investigations initiated by the Adhesives Committee of the Conjoint Board of Scientific Societies and also the researches of a more fundamental character which have been undertaken by the Adhesives Research Committee of the Department of Scientific and Industrial Research. The report is thus a comprehensive summary of the wor kfrom its inception in 1918, up to the end of 1921. It is illustrated with diagrams and photographic plates.

Electrically-driven Yachts.—Slowly yet surely electric transmission beteween marine motors and the propellers they have to drive is making headway. Possibly for tugs the advantages of big, slow-running propellers, perfect control from the pilot-house, and an almost unlimited range of speed may be found sufficient to counterbalance the cost. These benefits would be particularly pronounced for tugs of moderate power which are propelled by semi-Diesel engines, as the latter are notorious for their want of flexibility. With big tugs having Diesel engines of 1,000 h.p. and over, the speed range, although not so great as with electric transmission, is good enough for the purpose, while the normal revolutions can be sufficiently slow to allow of using big propellers. In yachts electric transmission is adopted for the sake of the easy control from the bridge, the silent reduction gear, the perfect flexibility, and the ability to move for short distances under electric power; also with it larger vessels can be controlled single-handed better than with the ordinary installation. For small cruisers the system is not worth while, since the steersman, being on the same level as the motors, is able to control them direct. It is in the vessel with the engine below and the wheel on deck where the benefits are more apparent. If large auxiliary yachts are to be driven by high-speed engines reduction gear is essential, and electric transmission is ideal for the purpose, while offering the other advantages to which reference has been made already. Admittedly the system is expensive, and, if anything, less efficient than the chain drive; but first cost is often of little consequence for yachts, the owners wishing to have the most perfect type of installation regardless of initial outlay. A not improbable reason for the growing popularity of electric transmission is the desire of some owners to astonish their friends by the possession of unusual machinery, the accruing advantages being a secondary consideration; moreover, when the system is fitted electric cooking and heating, as well as lighting, become practicable, while small motors can be used to lighten the domestic work. Whatever the cause, it is evident, from the number of recent examples on both sides of the Atlantic, that electric transmission is gaining in favour among yachtsmen.—*Light Motor.*

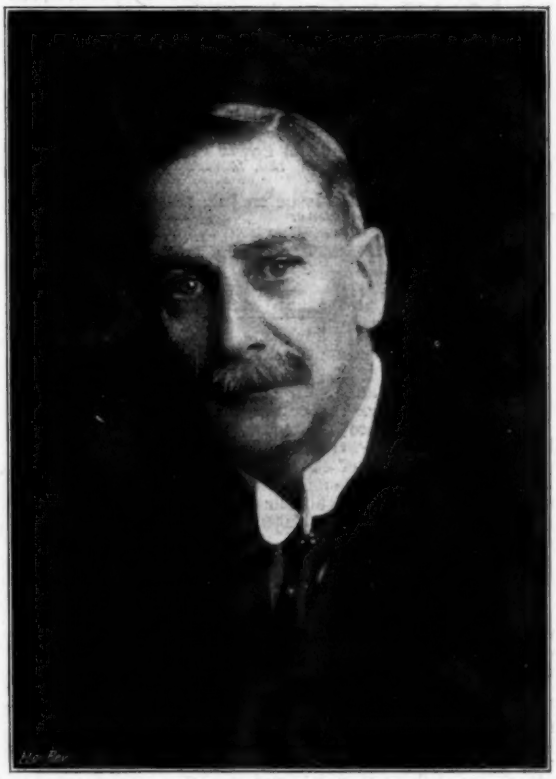
German Industry.—The *Financial News* of yesterday contains an interview with Dr. Felix Deutsch, Director-General of the A.E.G., under the title "German Industry Hemmed In." French animosity is described as the keynote of the present impossible situation. He asks: "How can one wonder at despair and insanity spreading in a nation which has been tortured and terrorised for the last three years without the least respite being granted to it?" Dr. Deutsch fails to excite our bowels of compassion, for how can we forget?

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the Electrical Review *posted as to their movements.*

Mr. Reginald Alexander Dalzell, C.B.E.—Mr. R. A. Dalzell, concerning whose appointment as Director of Telegraphs and Telephones a reference appeared in the Electrical Review for July 14th, was born in Poona in 1865. He was educated in Edinburgh and at Dulwich College, and joined the School of Electrical Engineering and Telegraphy in Hanover Square. When he entered the service of the Globe Telephone Co. in 1881, we were not a great deal advanced from the time when only musical sounds could be transmitted by means of the telephone. Indeed, it was only a few years earlier, in 1876, that Sir William Thomson (Lord Kelvin) had introduced Bell's speaking telephone to the British Association meeting in Glasgow. Mr. Dalzell took part in the erection of a telephone exchange for the Globe Co. at the Wool Exchange, where all the lines were single circuits. The Post Office started the first metallic circuit system at Newcastle, and when eventually Mr. Dalzell went to Sunderland to assist the Northern Telephone Co., a similar system was adopted by that company in Newcastle.

When the Globe Co. came to an end as the result of litigation with the United Telephone Co. over questions



Elliott & Fry.] [*London.*

Mr. R. A. Dalzell, C.B.E., Director of Telegraphs and Telephones.

affecting patents, Mr. Dalzell transferred to the latter company for the purpose of supervising the Globe apparatus which was then in operation. Neither of those early companies was overburdened with subscribers; the United had about 3,000 and the Globe a few hundred. On moving to Sunderland, where he was employed by the Northern District Co., Mr. Dalzell found that they had no subscribers at all in Newcastle; but the company soon established an exchange larger than that of the Post Office, which had just previously set up its first large exchange in the country there, and a fairly large *clientèle* was quickly obtained.

Mr. Dalzell recalls that in the old days two operators were required to handle a subscriber's local call. Under the original system the subscriber pressed a button on his telephone, thus causing a shutter to fall in front of the operator at the switchboard. She manipulated a flat plug, which she inserted in the switchboard to connect the caller with another operator who sat immediately behind her. The second operator inquired the number, and then passed it to the first operator, who proceeded to establish the connection. The whole process was comprised in one operator speaking with the subscriber and the other operator moving the plugs as required.

After successive periods of service as manager of the Blackburn and Leeds districts of the National Telephone Co. and district manager of the Western District of the National Co., with his headquarters at the old Pelican Club in Gerrard Street, Mr. Dalzell, in 1903, became Assistant Superintendent for London, an appointment which carried with it supervision of both the engineering and administrative sides of the business. He then moved on to Bristol as Superintendent of the West of England province, and he was stationed there in 1912, when the telephones were transferred to the Post Office. He was selected by the staff to give evidence before the Select Committee on the Post Office Telephone Agreement, the outcome of which was the acceptance of a modification of the agreement respecting the staff by the then Postmaster-General. Shortly after the transfer to the State, Mr. Dalzell returned to London, and, in 1916, became Chief Inspector of Telegraph and Telephone Traffic.

Prior to the opening of the Bristol Exchange, telephones were worked on the magneto system. Bristol was the first central battery exchange in the country, and Kensington Exchange was the next. Subscribers on those exchanges were relieved of the necessity of turning a handle to cause a bell to ring, or a shutter to fall, in order to secure the attention of the operator. Instead, most of the electrical apparatus was concentrated in the exchange, and the mere act of lifting the receiver at the subscriber's end caused a lamp to glow at the operator's desk in the exchange. This principle is followed at the present day at practically every large exchange throughout the country.

Mr. Dalzell has therefore seen the development of the so-called scientific toy from the original single-circuit wire, with Blake or Hunnings' transmitters and without multiple switchboards, through the period of metallic circuits, multiple switchboards and magneto operation, to the central battery system which, in its turn, is giving place to the automatic system. Automatic telephony is being rapidly developed, and Mr. Dalzell's view is that the future of telephony lies largely in that direction, but that there will always remain exceptional cases where manual operation will be necessary, either as regards more economical working, or more efficient service, or both. He hopes to see the automatic telephoning of London commenced in his time, but declares that it will be many years before such a scheme can be completed. Apart from technical considerations, the problem involves deep economical study.

Mr. Dalzell has visited the United States, and has made an exhaustive investigation of the telephone and telegraph systems. He has also made a close study of the systems of other telephone administrations. One of the main reasons for the efficiency secured in America lies, he thinks, in the fact that the use of the telephone is spread over a much longer period of the day than in Great Britain, where more than one-sixth of the trunk traffic is passed through in one hour of the twenty-four, while in America, where the working day is not so circumscribed, there is a more even distribution of traffic. The revenue-earning capacity per line is therefore very much lower in this country.

As regards future development, Mr. Dalzell's aim is to give effect to the Postmaster-General's stated policy, and he will take the public, whom he regards as the most important part of the organisation, into the full confidence of the Post Office, so that they may understand thoroughly what is being done in the way of research and development in respect of both telegraphs and telephones.

As an old telephone expert, Mr. Dalzell is painfully familiar with the congested state of the service when the Post Office took control ten years ago. It required many years of hard work to bring the system up-to-date; but that work was interrupted almost at the outset by the great war. After the Armistice the Post Office was faced with extraordinary difficulties in connection with the cost of labour and materials, and in obtaining urgently-needed equipment. The result was that the Post Office only got the machine going a year or eighteen months ago; but Mr. Dalzell looks to see all arrears of work overtaken within a measurable distance of time from now. Having noted a diminution of ill-informed criticism of the service, he is encouraged to think that, in addition to the improvements which have been effected by the staff, the public on their side have come to appreciate the difficulties under which the Post Office has been labouring through causes entirely beyond its control. "If there is co-operation between the Post Office and the public," says Mr. Dalzell, "so far as co-operation is practicable in a service possessing the complexities of the telephone serivce, it will go far towards securing that higher standard of efficiency in the working for which the Post Office is constantly striving."

On July 26th, Sir Joseph J. Thomson, O.M., F.R.S., was presented with the Franklin Gold Medal at the Department of Scientific and Industrial Research by Lord Balfour on behalf of the Franklin Institute, Philadelphia. Lord Balfour said that he had known many of the giants who rendered physics illustrious in this country, among whom was Lord Kelvin. One of the greatest pioneers in this scientific movement was Sir Joseph Thomson. In thanking Lord Balfour, Sir Joseph said that beside the personal element in the bestowal of the honour there was a contribution to the brotherhood of science between America and Britain.

The salary of Mr. F. A. Fitzpayne, deputy tramways manager of Edinburgh, has been increased from £570 to £625 per annum. A proposal to increase the salary of Mr. R. McLeod, traffic superintendent, is to receive further consideration.

The Times states that the Royal Dutch Institute of Engineers has appointed as honorary members Sir Charles Parsons, inventor of the Parsons Steam Turbine, Mr. J. H. Tudsbery, secretary of the Institution of Civil Engineers, and Mr. Charles le Maistre, secretary of the International Electro-Technical Commission in London.

In the *Sunday Times*, of Johannesburg, for July 9th, there appears an illustrated article concerning the Union Mint, which is now nearing completion at Pretoria, and will be turning out the new coinage towards the end of the year. Mr. Ralph Pearson, who has had lengthy experience at the Melbourne Mint, and at Ottawa and in London, is the deputy master, and Mr. J. T. Becklake, A.M.I.E.E., the second in command, went to Pretoria a month or two ago from the London Mint, where he had been for many years, save for a brief absence at the branch of the Royal Mint in Bombay, which was erected during the war, and is now closed.

Mr. J. J. Woods, consulting engineer, of Clones, Co. Monaghan, received a compound fracture of the right leg in a motor accident, and is confined as a patient in the Louth County Infirmary, Dundalk.

Senatore Marconi, G.C.V.O., LL.D., D.Sc., has been elected a vice-president of the Royal Society of Arts.

Mr. Charles Stewart, B.Sc., M.I.E.E., sales and contract manager of Messrs. Johnson & Phillips, Ltd., has been appointed a director of the company.

On Wednesday evening at the Cannon Street Hotel, a presentation was made to Sir George Sutton, Bart., by the staff and employés of W. T. Henley's Telegraph Works, Co., Ltd., and Henley's Tyre & Rubber Co., Ltd. A Bohemian concert followed. We hope to refer to the matter more fully in our next issue.

Mr. H. Fraser has resigned his position with the Electrical Engineering & Equipment Co., of London, and has joined the Priory Electrical Engineering Co., of Bath Street, Birmingham, as general manager.

Obituary.—Mr. W. Dow.—The death took place suddenly on July 23rd, of Mr. William Dow, founder and head of the firm of Dow & Sons, Ltd., electricians, Kilmarnock. He was 72 years of age, and had been in business in the town since 1875.

Mr. D. Gill.—The death took place on July 22nd, at the Hatch, Old Dover Road, Canterbury, of Mr. David Gill, A.M.I.E.E., late captain in the R.A.F. He was in his 31st year.

Sir Richard Vassar-Smith.—We regret to record that Sir Richard Vassar-Smith, chairman of Lloyd's Bank, passed away on Wednesday. Sir Richard was president of the Federation of British Industries in 1917-18.

Dr. Alexander Graham Bell.—We regret to learn, through *Reuter*, as we go to press, that Dr. Alexander Graham Bell, of telephone fame, passed away at his home at Baddeck, U.S.A., on August 1st.

Will.—The late Mr. W. E. Barrett, a director of the British Engine, Boiler & Electrical Insurance Co., Ltd., left £79,072 gross, and £67,811 net personalty.

NEW COMPANIES REGISTERED.

Electrads, Ltd. (183,311).—Private company. Registered July 22nd. Capital, £1,000 in £1 shares. To carry on the business of manufacturers, importers and exporters of and wholesale and retail dealers in all kinds of electrical apparatus, machines, instruments, accessories, &c. The subscribers (each with one share) are:—A. B. de Solla, 7, Bath Road, Bedford Park, W.4, electrical engineer; J. H. Douse, 33, Mulgrave Road, S.W.6, mechanical and electrical engineer. A. B. de Solla signs as managing director. Qualification, one share. Remuneration, £50 per annum. Registered office: Evelyn House, 62, Oxford Street, W.1.

Wireless Corporation, Ltd. (183,437).—Private company. Registered July 27th. Capital, £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in electric, magnetic, and wireless telegraphy and telephony apparatus, wires, cables, machinery, and appliances, engineers, &c. The subscribers (each with one share) are:—J. G. Evans, 110, Murchison Road, Leyton, E.10, clerk; J. W. Ironside, 88, Livingstone Road, Thornton Heath, engineer's representative. The subscribers are to appoint the first directors. Qualification, 10 shares. Remuneration, one guinea each per meeting attended. Secretary: R. Gray. Registered office: 7 and 8, Great Winchester Street, E.C.

British Wireless Supply Co., Ltd. (183,395).—Private company. Registered July 26th. Capital, £2,000 in £1 shares. To carry on the business of wireless, electrical, mechanical and general engineers, and contractors, manufacturers, and sellers of wireless instruments, transformers, radiators, dynamos, motors, and radio instruments of all kinds, &c., and to adopt an agreement with P. F. Perry. The first directors are:—P. F. Perry (permanent director and chairman), "Ainderby," The Green, Seaton Carew (manager of nautical and wireless schools); H. F. Yardley, 6, Blenheim Terrace, Leeds, wireless engineer. Qualification, £100. Secretary: J. Lyall. Registered office: 6, Blenheim Terrace, Leeds.

F. J. Jones & Sons, Ltd. (183,402).—Private company. Registered July 26th. Capital, £5,000 in £1 shares. To acquire the business of an electrical engineer and electrician carried on by Lily A. E. Jones and W. H. Haswell (trustees of the will of the late F. J. Jones) in Chester and elsewhere as "F. J. Jones & Sons." The first directors are:—G. D. Jones, 6, Seller Street, Chester; Lily A. E. Jones, 92, Foregate Street, Chester; C. L. Jones, 92, Foregate Street, Chester; Violet B. M. Jones, 92, Foregate Street, Chester; W. H. Haswell, 94, Foregate Street, Chester. All permanent, subject to holding 250 shares each. Remuneration as fixed by the company. Solicitor: C. P. Smith, Chester. Registered office: Old Bank Buildings, Chester.

Radioelectrico, Ltd. (183,388).—Private company. Registered July 25th. Capital, £1,050 in 800 preference and 200 ordinary shares of £1 each, and 1,000 deferred shares of 1s. each. To carry on the business of electricians, manufacturers of generators and accumulators, suppliers and distributors of electricity and electrical energy for lighting, heating, telegraphic and telephonic communications, and other purposes, &c. The first directors are:—P. J. H. Driscoll, 4, St. Paul's Road, Tottenham, N.; J. Kennelby, 73a, Lewin Road, Streatham, S.W.16; S. Hall, 18, Kimbull Gardens, Fulham, S.W.; R. H. Winter, 1, Cosfield Street, W.1, electrical engineer. The first three named are all directors of P. J. Driscoll & Co., Ltd. Remuneration, 5 per cent. of the net profits divided between them. Secretary: A. W. Deering. Registered office: 33, D'Arblay Street, Soho, W.

Waste Recovery Syndicate, Ltd. (183,454).—Private company. Registered July 28th. Capital, £10,000 in £1 shares. Objects:—To promote companies for the carrying on of businesses of all kinds; to carry on research work and the development of patents and inventions in the United Kingdom and elsewhere relating to the treatment of waste fuel residues, and the business of smelters, founders, rollers, platers in metals, metallurgists, chemical, mechanical, electrical, automobile, constructional, civil and consulting engineers, &c. The first directors are:—Sir James Heath, Bart., J.P., 5, Hans Place, S.W.; Major S. Weil, 3, Lancaster Gate Terrace, Hyde Park, W.2; Capt. H. G. Gilliland, "Myways," Church Crookham, Hants.; F. Winter, 2, Duke Street, St. James's, S.W.1; Lieut.-Col. A. St. J. Cooke, D.S.O., 14, Elvaston Place, S.W.7. Secretaries: St. John Cooke & Co. Registered office: 729-730, Salisbury House, E.C.

Wickford and District Electricity Supply Co., Ltd. (183,455).—Registered July 28th. Capital, £5,000 in £1 shares. To carry on at Wickford and elsewhere in Essex the business of an electric light company in all its branches. Minimum cash subscription, 7 shares. The provisional directors are:—H. F. Perry, 8, Park Grove Road, Leytonstone, E.11, cashier; F. W. Sitch, 1, Oak Crescent, Barking Road, E.16, clerk; D. C. Walsh, The Vicarage, Austinway, Gerrard's Cross, articled clerk; W. H. Butterfield, 17, New Road, Crouch End, N.8, manager; G. C. Baldock, 54, Strone Road, Forest Gate, E., clerk; C. A. Breading, 70, Park Road, Southend-on-Sea, clerk; Lily L. Brinkworth, 32, Kynaston Road, Stoke Newington, clerk. Qualification of subsequent directors, 50 shares. Solicitors: Swepstone, Stone, Barber & Ellis, Broad Street House, E.C.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Dawlish Electric Light and Power Co., Ltd.—Satisfaction to the extent of £150 on June 26th, 1922, of mortgage debenture dated July 25th, 1911, securing £2,000.

Olso Light Co., Ltd.—Issue on July 4th, 1922, of £12,500, part of a series already registered.

CITY NOTES.

Anglo-Portuguese Telephone Co., Ltd.

The annual meeting of this company was held on Monday at Worcester House, Walbrook, London, Mr. Herbert Allen presiding. In proposing the adoption of the report, the Chairman said that on the surface the accounts looked bright enough, but unfortunately all was not gold that glittered. The trading profit at the old rate of exchange amounted to £260,000; but the escudo, instead of being worth 53¼d., was last year worth on an average only 6¼d., and in that way the £260,000 boiled itself down to less than £30,000. Deducting administrative expenses, &c., a profit of £20,000 odd remained, and after payment of the fixed charges, they were left with a balance equal to about 2¼ per cent. on the share capital, which they were not justified in distributing. He believed that was the first year in the history of the company that the dividend had been entirely passed. The position naturally caused the directors very great concern, and early in the present year they felt compelled once more to approach the Portuguese Government for an increase in their subscription rates, that being the fifth occasion of their making a similar application in as many years. After seemingly interminable negotiations, the authorities eventually met them to some extent, but what they gave them with one hand they largely took back with the other, inasmuch as they debarred them from surcharging unexpired subscriptions, as they were allowed to do on the occasion of the previous increase. Over the two classes of subscribers—commercial and domestic—the increase averaged about 60 per cent., and on their present volume of business that would equal over 2¼ million escudos per annum; but it would be another year before the company would feel the benefit of the new rates. Notwithstanding the repeated increases in their subscription rates in the last few years, they were anything but high even now when compared with those of many other countries. In the event of the escudo recovering to 6¼d., the new charges might be subjected to revision. Although they knew pretty well to what extent the higher charges would affect their income and gross profits, much uncertainty attached to the question of exchange. The escudo at present was worth less than 4d., and one failed to see how any material recovery could be looked for in the present atmosphere of political instability in Portugal and while the printing press was still busy in turning out money. The Portuguese Budget for the current year showed a deficit of more than 300 million escudos, and the national expenditure was habitually double that of the national income. Under those circumstances it was difficult to see exactly how any improvement in the escudo was to come in. Having explained the adjustments which had been made in the balance sheet with the object of bringing its outer appearance more into line with the inner facts, the chairman referred to the resignation

of Capt. Jackson, who, he said, had felt obliged for personal reasons to resign his position as a director. Capt. Jackson had been on the board since 1899, and had given the company much valuable service. In his place the directors had appointed Mr. Percy Brailsford Lawson, and on the instructions of his colleagues that gentleman immediately on his appointment visited Portugal in order personally to acquaint himself with every phase of the company's business. Mr. Lawson had made a most interesting and valuable report on the position. He recognised that by comparison with other European cities the telephone systems of Lisbon and Oporto were greatly undeveloped, and that the company was suffering in consequence. In the main, Mr. Lawson approved the scheme which had been submitted by the company's engineers for the entire reconstruction of the Oporto system and of important additions to their facilities at Lisbon. Mr. Lawson recognised that the present position in those cities could not continue indefinitely, and he was of opinion that the longer the delay in carrying out some scheme of reconstruction and development, the more serious would the position become. The board had just decided that the work in both cities should be put in hand without further delay. On the question of establishing message rates instead of a flat rate, Mr. Lawson was of opinion that the matter was one which required further consideration before a decision was arrived at. Regarding the prospects for the current year, so far as he could see the new tariffs would give them an additional income of half a million escudos. He was afraid there would not be any reduction in expenditure because they had had to concede another increase in wages as from the first of this month in return for the increase in their tariffs. The great element of uncertainty in the business was that regarding the question of the exchange, but assuming an average of 4d. per escudo and other conditions being normal, the indications so far as he could read them seemed to point to their about holding their own this year, and that the result would be about the same as last year. Mr. F. W. Kerr seconded the motion, which was carried unanimously.

Ward & Goldstone, Ltd.

The net profit for the year ended March 31st is £15,351, of which it is estimated £6,622 will be absorbed by income tax and Corporation Profits Tax, leaving £8,729, plus the carry forward, which brings the amount available to £15,057. The 7 per cent. preference dividend and one of 3½ per cent. on the ordinary shares have already been paid, leaving £9,807, and it is proposed to further reduce the preliminary expenses account by £2,000 and to carry forward £7,807. According to the *Financier*, during the year the works were generally running at barely half capacity. Stocks have had again to be written down to the reduced prices ruling at stock-taking, and unfortunately substantial losses have been incurred due to bad debts, for which provision has been made. In view of the adverse conditions which have prevailed, the directors consider that the results obtained are not entirely unsatisfactory.

Marconi International Marine Communication Co., Ltd.

The annual meeting was held at the Connaught Rooms on July 25th, Mr. Godfrey C. Isaacs presiding, in the absence of Senatore Marconi. The deputy-chairman said that the directors had not considered it necessary to make any addition to the reserve this year, having regard to the fact that the amount on the other side of the account, representing licences, rights, and shares in other companies figured only at £231,880. The reserve for obsolescence of plant had been reduced from £100,000 to £57,254, owing to the writing-off of the value of apparatus of an old type which had been replaced. There was a net increase of £70,000 in the amount representing plant, apparatus, furniture, and stores. The item "Expenses of ship telegraph stations, including loss of plant and apparatus and cost of training operators" showed an increase of about £200,000. This was principally due to the fact that the laying up of many ships had led to decreased receipts from shipowners on account of additional operators. The increase in the item "Depreciation of plant, apparatus, and furniture" was accounted for by a larger number of ships' stations. On the credit side, the amount received in respect of "Ships' telegrams, contracts, rentals, &c.," amounted to £1,084,460, an increase of £150,000; a substantial part of this, however, was in respect of operators' salaries, which came under contracts, but did not add anything to the net revenue of the company. The net profit of £118,043 could be considered satisfactory when the depressed state of the shipping industry was taken into consideration. If the directors had cared to enforce the terms of the contracts the resultant profit would have been doubled, but the policy was adopted of varying the conditions, and the company bore a share of the loss which the industry had suffered. The speaker was glad to say that about half the ships which had had to be laid up were again in commission and a substantial number of operators had been re-engaged. Mr. Isaacs referred to the recent telegraphists' dispute, and said that the provisional agreement put into force on April 1st, and further discussions, led him to believe that a satisfactory final agreement would be reached. The development of "broadcasting" of wireless telephony would create a great demand for telephone receiving sets at sea, and the company anticipated that a new source of revenue would be opened. There had been a substantial growth in the use of the wireless direction finder, and many lives had been saved by this means; he anticipated a still further increase as trade improved.

In announcing the dividend of 10 per cent., he urged shareholders not to be despondent, although it was 5 per cent. lower than the previous year's dividend; it was not a reflection upon the company's business, but upon the bad state of trade. A recurrence of similar conditions would not have such an adverse result, as the company's organisation had been adjusted to meet any circumstances; a recurrence, however, was not anticipated.

The report and accounts and dividend were approved, and the retiring directors re-elected.

Greenwood & Batley, Ltd.—Col. O. C. Armstrong, presiding at the annual meeting on July 25th, said that thanks to a full order-book at the beginning of the year they had been able to keep most departments fairly well employed, but the effect of the slump was now being felt. It was possible, however, to pay the proposed dividend out of earnings. The action of foreign countries to protect themselves from the effects of depreciated currency took the form of high tariffs, and it was not possible in many instances for this country to reply in a similar manner. There was need for action in this direction if British traders were not to be handicapped.

Companies Struck Off the Register.—The following companies have been struck off the Register, and are accordingly dissolved:—

British Sherardizers, Ltd.
Colonial Engineering Agency, Ltd.
Denton Electrical Construction Co., Ltd.
Derby Lamp Works, Ltd.
E. M. F. (1914), Ltd.
Electric Timekeepers, Ltd.
Electro Galvanizers, Ltd.
Holmquist Electric Co., 1911, Ltd.
Londonderry-Moville Electric Railway Syndicate, Ltd.
Roger Dawson, Ltd.
Sandbanks Railless Electric Car Co., Ltd.
Standard Turbine Co., Ltd.
United States Railless Electric Traction Co., Ltd.
Westminster Technical Experts Corporation, Ltd.

Stock Exchange Notices.—Dealings in the following securities have been specially allowed under Rule 148a:—

Auckland Electric Power Board.—£350,000 5½ per cent. debentures, August 1st, 1943, issued at par, fully and partly paid.

County of London Electric Supply.—500,000 new ordinary shares of £1 each, issued at 22s. 6d., fully and partly paid. Nos. 755,781 to 1,255,780; and 500,000 new 6 per cent. cumulative preference shares of £1 each, fully and partly paid, Nos. 2,150,001 to 2,650,000.

Bengal Telephone Corporation, Ltd.—£350,000 7 per cent. first mortgage bonds, issued at 97 per cent., partly and fully paid.

The undermentioned have been ordered to be officially quoted:—

Brompton and Kensington Electricity Supply.—196 ordinary shares of £5 each, fully paid, Nos. 34,500 to 34,695.

Cordoba Light, Power and Traction.—665,811 7 per cent. preference shares of £1 each, fully paid, Nos. 1 to 665,811; and £303,877 6 per cent. debenture stock.

Stone (J.) and Co.—600,000 6½ per cent. cumulative preference shares of £1 each, fully paid, Nos. 1 to 600,000.

Yorkshire Electric Power.—803,060 ordinary shares of £1 each, fully paid, Nos. 1 to 6,990, 15,991 to 270,380, 270,991 to 278,230, 279,031 to 378,100, 378,601 to 429,250, 429,351 to 494,570, 495,321 to 520,990, 533,601 to 611,710, 612,211 to 639,280, 640,481 to 674,100, 674,831 to 791,230, and 791,431 to 830,000.

Cordoba Light, Power, and Traction Co., Ltd.—The annual meeting was held on July 28th. Sir George A. Touche, who presided, said that although the effects of the capital re-organisation were not reflected in the accounts, they showed the "decks cleared for action." With reasonably good fortune and consideration from the Government authorities the ordinary shareholders might look forward to receiving at least a part of the return which they deserved upon their capital. They could be sure that the President-elect of Argentina (Dr. Marcelo de Alvear) would give just and sympathetic consideration to the proper claims and rights of British companies which had played so great a part in the development of the country. During the current year, business had been expanded and expenses had decreased; the outlook might therefore be regarded as satisfactory.

Bournemouth and Poole Electricity Supply Co., Ltd.—Interim dividends upon the 4½ per cent. preference shares and the 6 per cent. second preference shares, less tax, for the half-year ended June 30th, 1922; also an interim dividend on the ordinary shares at the rate of 5 per cent. per annum, less tax, for the same period.

Metropolitan Railway Co.—Interim dividend at the rate of 2½ per cent. per annum on the ordinary stock, which compares with 1¼ per cent. per annum paid in respect of the corresponding period in 1921.

Tottenham District Light, Heat, and Power Co.—Dividends are announced for the half-year ended June 30th at the rate of 7½ per cent. per annum on the "A" stock and 6 per cent. per annum on the "B" stock, less tax. A year ago the dividends were at the rate of 6 per cent. and 4½ per cent. per annum respectively.

Kalgoorlie Electric Tramways, Ltd.—The accounts for 1921 show gross receipts of £28,632, against £37,630, and the net profits, before charging depreciation, were £5,817, against £8,742, making the debit balance of profit and loss, after charging debenture service, £54,520.

Westminster Electric Supply Corporation, Ltd.—The directors announce an interim dividend at the rate of 9 per cent. per annum, less tax, for the half-year ended June.

Brazilian Traction, Light and Power Co.—Dividend of 1 per cent. on ordinary capital stock.

National Gas Engine Co., Ltd.—Interim dividend at the rate of 5 per cent. per annum, less tax, on the preference shares, and 7½ per cent. per annum, less tax, on the ordinary shares for the half-year ended June.

Bristol Tramways and Carriage Co., Ltd.—Interim dividend for the half-year ended June 30th, 1922, at the rate of 3 per cent. (free of income tax) on the ordinary shares.

North London Railway Co.—Interim Dividend of 2½ per cent. for the half-year, as against 2¼ per cent. last year.

National Boiler and General Insurance Co., Ltd.—Interim dividend of 12s. per share, less tax, on the ordinary shares.

STOCKS AND SHARES.

TUESDAY EVENING.

MARKET activity in the Stock Exchange is of a very spasmodic order. It is anomalous that there should be so many features of interest round the markets, while at the same time, animation in the shape of business is lacking, except in a very few directions. From the point of view of those interested in electricity stocks and shares, the main interest this week lies in the allotment of the County of London Electric shares. There was considerable over-subscription. Shareholders alone applied for more than the amount of preference and ordinary that were offered. It is superfluous to say that the ordinary shares received most attention. They offer more speculative scope, and the announcement of an increased interim dividend flatters the expectation that the usual 8 per cent. for the full year will be augmented when the twelve months' accounts are published.

It is the same expectation of increased dividends for the year which assists the remarkably strong tone shown by the electricity supply market as a whole. If prices do not go up as quickly as proprietors would like to see, this is because prospective buyers see no particular object in pressing to have quotations raised in the Stock Exchange lists. They want to buy as cheaply as possible and a mere putting up of prices, at a time when there are few sellers, sometimes has the opposite effect anticipated by those who think that the process may tempt holders to realise their stock.

Charing Cross ordinary are 5s. higher. Kensingtons promptly regained the full amount of the dividend deducted from the price last week. St. James' and Pall Mall received similar treatment. City "Lights" have risen to just over 40s. County ordinary recovered the 2s. 6d. lost on the announcement of the new issue of shares.

Last week was one of festivities and celebrations in connection with the jubilee of the Eastern Telegraph and its associated companies. Those who were invited to the functions appear to have been much more pleased than the inhabitants of one of the northern suburbs whose rest was disturbed by firework displays, of which no previous notice had been given. The market for the stocks in the House is quiescent, and no particular alteration has occurred in any of the quotations this week. Certain of the American cable stocks and shares have risen by several points, in response to the movement in the rate of exchange.

A feature is the renewed weakness in the price of Marconi shares. After touching 46s., a relapse occurred to 42s., evidently on sales by those who wax apprehensive of what the final dividend may turn out to be. Estimates range from nothing at all to 5 per cent. An interim dividend of the latter rate was paid in December, and for the six months prior to that, the dividend was 2s. per share. Since then, the price of Marconis has been up to 56s. 6d., and dozens of limits were left with Stock Exchange brokers to sell at £3 a share. Most of the holders, it is safe to say, will be content to regard their Marconis as an investment which, in course of time, will benefit from the developments which obviously lie ahead, but there is no doubt that the relapse in the price of the shares, together with the modified dividend estimates, are giving rise to a good deal of disappointment as well as uneasiness.

Home Railway stocks are suffering from neglect. Most of the dividends are out, and with nothing much "to go for," as the Stock Exchange phrases it, for some little time the speculative element is inclined to sell stock and to stand by, awaiting further chances later on. The demand for lower fares, based partly on the modification of assessments secured by the railway companies in the parishes through which the lines run, is offset by the obviously uncomfortable conditions of crowded travelling with which most people are unpleasantly familiar. After the holidays, there will probably be a substantial issue by one of the tube railways as a further addition to the six million pounds' capital authorised by the Government, of which about 2¼ millions has lately been raised by the London Electric and City & South London railways.

East London debentures are moving steadily upwards day by day. The ordinary stock, however, remains about 4¼. Underground Electric ordinary shares have recovered the half-a-crown which they shed a week ago and the Income bonds at 82½ are a point to the good.

The Brazilian Traction Co. has declared another 1 per cent. quarterly dividend, from which it is apparent that the company means to maintain a 4 per cent. annual dividend on the common stock. The price is ex dividend at 50, so that the yield on the money is 8 per cent. British Columbia deferred has given way a point. Mexico Tramway sixes are 2 lower, but the fives rose to 72½. Mexican matters being still in suspense, the tendency is for the market to droop.

Amongst the new issues, Bengal Telephone 7 per cent. Bonds have risen to 3¼ premium, most of the stags having now cleared out of their stock. A lively market in the new County ordinary opened on Tuesday morning. At the outset, the price went to 2s. 9d. premium, from which it subsided to 2s. 3d. premium as sellers came in to take the handsome profit which they were able to secure with so little trouble. The preference stand at 9d. premium. In view of the scarcity of shares in the electricity supply market, there can be little doubt that, by degrees, the price of the ordinary will harden up, but it is natural enough that applicants should be willing to take the very useful turn which the present premium offers.

British Electric Traction ordinary stock at 52½ and the company's 6 per cent preference at 90 are both better. Calcutta Tramways rose to 4½, and, in the London group, London United Tramways preference at 4s. 6d., and the debenture stock at 57, are both higher. There has been a little demand for British Electric Transformers; the price hardened to a guinea, the preference being about 3d. per share less. General Electrics at 18s. 9d. are ex-dividend and, therefore, show little change. Siemens improved to 27s., and the other stocks and shares in the manufacturing list kept very steady. The rubber market is entirely stagnant. Amongst iron and steel shares, the only changes worth noticing are slight improvements which have occurred in connection with the greater activity brought about in British trade circles owing to the railway and engineering strike in the United States.

SHARE LIST OF ELECTRICAL COMPANIES.

	Dividend 1920.	Dividend 1921.	Price Aug 1. 1922.	Rise or fall.	Yield p.c.
HOME ELECTRICITY COMPANIES.					
Brompton Ordinary	12	12	7½	—	£8 0 0
Charing Cross Ordinary	8	9	7½	+½	6 0 0
do. do. do. 4½ Pref.	4½	4½	84	—	5 16 2
Chelsea	6	6	6		5 0 0
City of London	14	14	2¾	+1/32	6 18 0
do. do. 6 per cent. Pref.	6	6	22/6	—	5 6 8
County of London	8	8	11	+⅛	5 16 5
do. do. 6 per cent. Pref.	6	6	1¼	—	5 13 0
Kensington Ordinary	9	10	7¼xd	+1/16	7 0 7
London Electric	2½	4	2¾	—	5 14 0
do. do. 6 per cent. Pref.	6	6	5	—	6 0 0
Metropolitan	7	7	5¾	—	6 13 4
do. 4½ per cent. Pref.	4½	4½	9¼	—	5 16 2
St. James' and Pall Mall	12	12	8¾xd	+1/16	6 17 2
South London	7	7	8¼	—	8 0 0
South Metropolitan Pref.	7	7	1 7/8	—	5 18 0
Westminster Ordinary	10	10	7½	—	6 18 0
TELEGRAPHS AND TELEPHONES.					
Anglo-Am. Tel. Pref	6	6	105	+1	5 14 5
do. Def.	1½	34/6	23⅜	—	7 7 6
Chile Telephone	6	6	6¼xd		4 18 0
Cuba Sub. Ord.	7	7	8⅜	—	8 4 8
Eastern Extension	10	10	18½	—	5 8 1
Eastern Tel. Ord.	10	10	186½	—	5 7 3
Globe Tel. and T. Ord.	10	10	19½	—	5 4 7
do. do. Pref.	6	6	11½	—	5 6 8
Great Northern Tel.	24	22	29		7 11 8
Indo-European	10	10	86½	—	6 17 0
Marconi	25	15	2 1/16	—1/16	7 3 2
Oriental Telephone Ord.	12	12	22	—	*5 1 1
United R. Plate Tel.	8	8	7	—½	*5 14 4
West India and Panama	Nil	Nil	5/-	—	Nil
Western Telegraph	10	10	19	+	*5 5 3
HOME RAILS.					
Central London Ord. Assented	4	4	88	—	5 17 8
Metropolitan	1½	2½	48	—	4 13 9
do District	Nil	1	38xd	+½	2 12 8
Underground Electric Ordinary	Nil	Nil	2¾	+⅛	Nil
do. do. "A"	Nil	Nil	6/6	—	Nil
do. do. Income	2	4	82½	+1	*4 17 7
FOREIGN TRAMS, &c.					
Anglo-Arg. Trams, First Pref.	5½	12½	8 7/8	—1/8	8 0 0
do. do. 2nd Pref.	Nil	5½	34xd	+2/-	7 2 0
do. do. 5 per cent. Deb.	5	5	82	+½	6 2 0
Brazil Tractions	Nil	Nil	50xd	—1	8 0 0
British Columbia Elec. Ry. Pce.	5	5	76	—	6 10 9
do. do. Preferred	5	20/-	68½	—	*6 15 0
do. do. Deferred	3	12½/-	74½	—1	*3 5 10
do. do. Deb.	4½	4½	78	—	5 9 0
Mexico Trams. 5 per cent. Bonds	Nil	Nil	72½	+1	—
do. do. 6 per cent. Bonds	Nil	Nil	49⅝	—2	Nil
Mexican Light Common	Nil	Nil	21½	—1	Nil
do. Pref.	Nil	Nil	51	—	Nil
do. 1st Bonds	Nil	5	68½	—	7 6 0
MANUFACTURING COMPANIES.					
Babcock & Wilcox	15	16	3	—	5 6 8
British Aluminium Ord.	10	10	18/3	—	—
British Insulated Ord.	15	15	2¾	—	7 1 2
Callenders	15	15	2 3/16		6 16 4
" 6½ Pref.	6½	6½	1 1/16	—	5 9 5
Crompton Ord.	10	5	15/-	—	6 13 4
Edison-Swan	10	Nil	3/3		Nil
do. do. 5 per cent. Deb.	5	5	64	—	7 16 4
Electric Construction	10	10	1½	—	8 0 0
English Electric	8	5	17/6	—	5 14 3
do. do. Pref.	6	6	18/9	—	6 8 0
Gen. Elec. Pref.	6½	6½	22/-	—	5 18 2
do. Ord.	10	5	18/9xd	—	5 6 8
Henley	15	15	2⅝	—	6 13 4
do. 4½ Pref.	4½	4½	4¾	—	5 2 10
India-Rubber	10	—	⅛	—	—
Met.-Vickers Pref.	8	8	3 1/16	—	6 11 2
Siemens Ord.	10	10	27/-	+9d.	*7 8 2
Telegraph Con.	20	20	26	—	*4 12 2

* Dividends paid free of Income Tax.

ELECTRICAL PROPULSION OF MERCHANT SHIPS.

By A. REGNAULD, B.Sc. (Eng.), A.R.C.Sc., A.M.I.E.E.

Particular interest attaches to the announcement that Messrs. Cammell, Laird & Co., Ltd., recently received an order to build three vessels for the United Fruit Co., of Boston, U.S.A., not only because it represents the first substantial shipbuilding order that has been booked for many months past, but also because the vessels are to be electrically propelled, Camellaird-Fullagar oil engines being employed to drive the electrical generators. It has been stated that as a result of the Washington Conference, at which the decision was made to suspend for a period the building of large warships, the development of electric propulsion would be seriously affected, and certainly the decision there arrived at has led to the cancelling of the orders for many vessels which were to have been electrically propelled. Among these, mention may be made of the American super-battle-cruisers of 43,500 tons displacement, which were to have a speed of 33.6 knots, requiring no less than 180,000 horse-power to propel them. It was also stated that one of the four "super-Hoods" which had been projected for the British Navy was to have been electrically propelled, although no official confirmation of this statement was ever given.

The principles underlying the application of electric propulsion to merchant vessels are, however, so vastly different from those which have led to its successful application to the propulsion of warships that the development of the system is not likely to be affected to any appreciable extent by the "naval holiday." In war vessels, the chief advantage of electric propulsion lies not so much in its greater economy from the point of view of fuel consumption, as in the greater flexibility which can be obtained by employing electric motors to drive the propeller shafts. When electric propulsion is employed, the main turbo-generators are kept running at full speed, starting, stopping, and reversing being carried out entirely by operating the motor switchgear —a comparatively simple matter—whereas in a turbine-driven vessel, all manœuvring must be carried out at the main turbines. Further, on war vessels which are frequently navigated for long periods at a cruising speed, with electric propulsion this can be obtained by shutting down one or more of the turbo-generators, the others operating at full load and therefore at maximum efficiency instead of, as in the geared-turbine drive, operating all the turbines at reduced speed, or, in other words, at low efficiency. In a merchant vessel, save for the brief periods when she is navigating in and out of harbour, she is being driven at her maximum speed with all the turbines developing full power. Hence the question of flexibility hardly arises.

The question is then: What are the advantages of electrical propulsion for merchant vessels? In the first place, it is necessary to distinguish between the turbo-electric drive in which steam turbines are employed to generate the necessary electrical energy to operate the motors which drive the propellers, and the Diesel-electric drive in which, as the name implies, one or more Diesel engines are employed to drive the generators. With the former, it must be admitted that economy in fuel consumption is not likely to be achieved by the substitution of "electric gearing" for mechanical speed reduction gearing. On turbine-driven vessels, the steam turbines are run at high speed, *i.e.*, at their maximum efficiency, while in order to obtain a high propulsive efficiency it is essential that the propeller shall rotate at a comparatively low speed. Helical gearing has been developed to such a high degree of perfection that in a well-cut single reduction gear the efficiency of transmission will be as high as 98 per cent. But with the introduction of higher turbine speeds, it has been found necessary to employ a double instead of a single reduction, the reduction in speed between the turbine and the propeller taking place in two steps instead of one, with two pinions and two gear wheels, and as a result the efficiency is somewhat reduced, although 96 per cent. can be obtained with a well manufactured double reduction gear. But far more serious than this is the fact that the double reduction gear does not appear to be capable of withstanding the loads to which it is subjected with the same degree of reliability as can the single reduction gear, slight errors in cutting the teeth or in the alignment of the shafts apparently having very serious results. A number of cases of failure have occurred with these gears, and as a result many are being run at considerably less than their designed load. The confidence of shipowners in the reliability of mechanical reduction gearing has been shaken, and they are prepared to consider alternative systems of speed reduction. Hence the appeal of the electric drive.

Electric propulsion is merely a method whereby the economical speed of the turbine can be reduced to the economical speed of the propeller shaft. The steam turbine is direct-coupled to an alternator, and the current from this drives a low-speed motor which is generally directly coupled to the propeller shaft. It is not to be expected that the combined efficiency of a high-speed generator and a low-speed motor will be equal to that of the double-reduction gearing, viz., 96 per cent.; in fact, it is usual to assume that the efficiency of the electric speed reduction gear will be from 88 to 90 per cent., so that assuming that the efficiency of the turbine remains the same, it is apparent that the fuel consumption will be somewhat greater. In the usual type of marine turbine, however, special units have to be fitted for driving the vessel astern; these are eliminated when electric propulsion is adopted. Moreover, a higher turbine speed can be employed than is possible with mechanical reduction gearing, and thus a greater turbine efficiency is obtained. It can, therefore, be asserted that as far as fuel consumption is concerned, there is very little to choose between the two systems. Many builders of electrically-propelled ships, both in this country and abroad, have installed Ljungström turbo-generators, and owing to the high efficiency of this type of prime mover, the claim can be substantiated that electric propulsion means a lower fuel consumption. The Ljungström turbine cannot be conveniently applied to driving through mechanical gearing.

The chief advantage of electric propulsion lies in its greater reliability. The turbines are simpler by the elimination of the astern units, and as a result on entering and leaving harbour there is no danger of distortion of the various parts of the turbine due to alternate heating and cooling as the vessel is manœuvred either ahead or astern. Further, the substitution for the mechanical gearing of well designed generators and motors of sturdy construction removes another source of weakness, while the simplicity of control, which has been so enthusiastically commented upon by engineers who have had charge of electrically-propelled ships, all makes for reliability with a consequent increase in the money-earning capacity of the ship due to the elimination of idle periods when she is undergoing repairs. One other advantage must be mentioned, although it does not apply to all electrically-propelled vessels. In some designs it is the practice to place the motors in a compartment right aft instead of in the engine room. In this way the long length of shafting between the engine room and the stern of the vessel is dispensed with, and no shaft tunnel is required. This means that the capacity of the after holds is substantially increased, which for vessels carrying bulky cargoes, such as fruit, is of considerable value. There is, however, the difficulty of ensuring adequate attention to the

motors if they are not directly under the eye of the engineer on watch, and the task of passing along the deck from the engine room to the motor room—particularly if there is a heavy sea running—may lead to the motors being neglected. It is not considered economical to increase the engine room *personnel*, and hence many designers do not favour the idea of placing the motors in a separate compartment.

Diesel-electric propulsion is being widely advocated at the present time, particularly in the United States, where the use of electricity on board ship is regarded with greater favour than in this country. The chief advantage of electric propulsion in conjunction with Diesel engines lies in the fact that it enables an improved design of Diesel engine to be employed. With one or two minor exceptions, mechanical reduction gearing has not been tried on Diesel-propelled ships, the reason being that the engine can be designed to run at a sufficiently low speed to give a fairly economical propeller speed. But one of the most unsatisfactory features of the marine Diesel engine is the reversing and manœuvring gear, and the electric drive would enable designers to dispense with this since, once started up, the engine is run continuously at constant speed while the vessel is being navigated in and out of harbour. Further, it is possible, when the Diesel engine is directly coupled to an electric generator, to design the former to run at a higher speed, say, of from 300 to 350 r.p.m. instead of a maximum of about 120 revs. per minute with the direct drive. This means that the engine is considerably lighter for a given power and consequently cheaper to construct. Greater reliability is obtained, not only on account of the absence of reversing gear, but also on account of the reduction of vibration which follows the lightening of the reciprocating parts.

The advantages are not, however, all on the side of electric propulsion. It is undoubtedly a fact that the cost of the machinery for an electrically-propelled vessel is greater than that of the corresponding double-reduction geared turbine equipment or the direct Diesel drive. Certain large savings to which reference has been made above may, when spread over a number of years, more than offset this greater capital cost, and the advocates of the electric drive are confident that in the long run it will prove more economical for merchant ships than any of the existing forms of drive. So far, of course, no definite figures are available whereby this claim can be substantiated, since, although there are a number of electrically-propelled merchant ships in service, they have not been running sufficiently long to enable a definite comparison to be made. But the results obtained have thoroughly justified the confidence which has been placed in the merits of the electric drive, and it is to be hoped that those shipowners who have been bold enough to risk considerable sums of money in the trial of a new type of propelling machinery, will receive a full reward for their far-sighted policy, not only from a monetary point of view, but in the knowledge that by their action they are helping to keep the British Mercantile Marine in its proud position in the forefront of the merchant services of the world.

THE CONTRACTOR AND WIRELESS.

By J. M. C. FIELD.

Now that the first rush of the sudden demand for amateur wireless gear is over, the local contractor is probably debating whether to establish a permanent wireless department or not. The tremendous impulse given to the trade by the recent newspaper publicity has had far-reaching effects, and there is no reason why the local electrical contractor should not benefit thereby to a considerable extent.

Why should the public be forced to buy "through the post" when the local man has showrooms, &c., all ready for the sale of wireless gear, and is always there, ready to help, advise, and supply from stock the batteries, valves, and general sundries necessary for the amateur's installation?

Many hesitate to stock wireless apparatus because they themselves have not a sufficient knowledge of radio work to be able to "talk shop" with the more scientific type of amateur.

To a certain extent this is true, and in that case the contractor has two alternatives. One is simply to sell the stuff that is asked for, and not to claim to be well up in wireless work; and the second is to employ a wireless expert who can deal with any question that is put to him by the old hand, and who can also give sound advice to the novice.

If the business is in a favourable position for the establishment of a wireless department, the contractor will be well advised to take the latter course, as it is the only one that is really satisfactory.

There are hundreds of ex-sea-going wireless operators to-day who would be suited to the job. If they possess a first-class P.M.G. certificate, it may be taken for granted that they understand their work, as this certificate is much harder to get than is popularly supposed. It is, of course, necessary to choose a man who also possesses business capacity, and is sufficiently smart and keen on the job.

The ex-operator will be found to have an excellent knowledge of elementary electrical engineering, and should be a great asset in the showroom and office of the general business, apart from the wireless department. Furthermore, he being an expert telegraphist, it could be arranged for him to give instruction in Morse code. This is a very important point, as many young men are learning wireless by post and find that, although they can undoubtedly learn the technical part by correspondence courses, it is necessary to take personal instruction in telegraphy. The combination of the two then enables them to sit for the P.M.G. examination without even seeing an expensive "wireless college."

Again, the really enthusiastic amateur will not be content to listen only to wireless concerts for long. He, too, will need to learn Morse in order to understand the most interesting working between ships and shore, and also the foreign Press messages and weather reports.

But the wireless expert's work need not end here. He can earn further money by fitting up aerials, erecting, testing, improving, and extending customers' installations. Also his electrical and business knowledge will enable him to be profitably employed in assisting in the general work of the business, should the wireless work not occupy his whole time.

Altogether it could hardly be said that his salary would not be thoroughly well earned.

TRADE STATISTICS OF SOUTH AFRICA.

The following statement, showing the imports of electrical and similar goods into the Union of South Africa during the year 1921, has been compiled from the recently-issued official trade statistics. The figures for 1920 are added for purposes of comparison, and notes of any increases or decreases are made:—

	1920	1921	Inc. or Dec.
Electrical cable and wire.—	£	£	£
Total	417,000	394,000	– 23,000
From Great Britain	394,000	377,000	– 17,000
,, Japan	2,000	—	– 2,000
,, United States	20,000	14,000	– 6,000
,, Germany	—	1,000	+ 1,000
Batteries, primary.—			
Total	30,000	30,000	—
From Great Britain	6,000	13,000	+ 7,000
,, United States	18,000	11,000	– 7,000
Batteries, secondary.—			
Total	74,000	37,000	– 37,000
From Great Britain	26,000	17,000	– 9,000
,, United States	47,000	20,000	– 27,000
Heating and cooking apparatus.—			
Total	41,000	42,000	+ 1,000
From Great Britain	31,000	25,000	– 6,000
,, United States	9,000	17,000	+ 8,000

	1920	1921	Inc. or Dec.
Insulators, porcelain.—	£	£	£
Total	7,000	7,000	—
From Great Britain	6,000	5,000	– 1,000
,, United States	—	1,000	+ 1,000
Insulators, all other.—			
Total	1,500	2,500	+ 1,000
From Great Britain	1,300	2,000	+ 700
Lamps, incandescent.—			
Total	78,000	133,000	+ 55,000
From Great Britain	25,000	59,000	+ 34,000
,, Holland	21,000	31,000	+ 10,000
,, United States	32,000	33,000	+ 1,000
Motors.—			
Total, kW	12,000	15,500	+ 3,500
£	151,000	240,000	+ 89,000
From Great Britain, kW ...	5,600	7,600	+ 2,000
£ ...	80,000	106,000	+ 26,000
,, United States, kW ...	6,000	7,300	+ 1,300
£ ...	68,000	128,000	+ 60,000
Transformers.—			
Total	30,000	71,000	+ 41,000
From Great Britain	10,000	38,000	+ 28,000
,, United States	20,000	33,000	+ 13,000
Electrical Machinery, other.—			
Total	321,000	396,000	+ 75,000
From Great Britain	199,000	198,000	– 1,000
,, United States	113,000	188,000	+ 75,000
,, Germany	—	5,000	+ 5,000
Electrical material, other.—			
Total	482,000	524,000	+ 42,000
From Great Britain	362,000	328,000	– 34,000
,, United States	90,000	158,000	+ 68,000
,, Japan	9,000	4,000	– 5,000
,, Holland	5,000	4,000	– 1,000
,, Germany	—	14,000	+ 14,000
Cranes.—			
Total	60,000	90,000	+ 30,000
From Great Britain	47,000	55,000	+ 8,000
,, United States	13,000	15,000	+ 2,000
,, Canada	—	20,000	+ 20,000
Elevators and lifts.—			
Total	27,000	66,000	+ 39,000
From Great Britain	24,000	62,000	+ 38,000
,, United States	3,000	4,000	+ 1,000
Mining Machinery.—			
Total	618,000	941,000	+ 323,000
From Great Britain	419,000	555,000	+ 136,000
,, Sweden	—	9,000	+ 9,000
,, United States	195,000	347,000	+ 152,000
,, Germany	—	21,000	+ 21,000
Telegraph and telephone material.—			
Total	32,000	60,000	+ 28,000
From Great Britain	24,000	38,000	+ 14,000
,, Sweden	2,000	5,000	+ 3,000
,, United States	6,000	13,000	+ 7,000
Tramway rails.—			
Total	21,000	37,000	+ 16,000
From Great Britain	20,500	32,000	+ 11,500
,, United States	500	5,000	+ 4,500
Tramway rolling-stock.—			
Total	87,000	55,000	– 32,000
From Great Britain	34,000	14,000	– 20,000
,, United States	53,000	41,000	– 12,000
Other tramway materials.—			
Total	17,000	38,000	+ 21,000
From Great Britain	3,000	25,000	+ 22,000
,, United States	13,000	13,000	+ —
Pumps.—			
Total	199,000	150,000	– 49,000
From Great Britain	101,000	87,000	– 14,000
,, United States	36,000	82,000	+ 46,000
Engines, oil, petrol and spirit.—			
Total	92,000	43,000	– 49,000
From Great Britain	52,000	31,000	– 21,000
,, United States	36,000	10,000	– 26,000
Engines, other.—			
Total	67,000	143,000	+ 76,000
From Great Britain	59,000	139,000	+ 80,000
,, United States	8,000	3,000	– 5,000

In addition to the above the following goods were imported as "Government stores":—

	1920	1921	Inc. or Dec.
Batteries, primary.—	£	£	£
From Great Britain	3,500	3,200	– 300
,, United States	—	1,500	+ 1,500
,, Denmark	—	5,000	+ 5,000
Batteries, secondary.—			
From Great Britain	21,000	4,000	– 17,000
,, United States	16,000	—	– 16,000
Heating and cooking apparatus.—			
From Great Britain	—	4,000	+ 4,000
Insulators, porcelain.—			
From Great Britain	10,000	4,000	– 6,000
Motors and parts.—			
From Great Britain, kW ...	100	344	+ 244
£ ...	1,800	11,000	+ 9,200
Electrical cable and wire.—...			
Total	86,000	256,000	+ 170,000
From Great Britain	74,000	203,000	+ 129,000
,, United States	5,000	12,000	+ 7,000
,, Canada	7,000	40,000	+ 33,000
Telegraph and telephone material.—			
Total	125,000	196,000	+ 71,000
From Great Britain	107,000	104,000	– 3,000
,, United States	6,000	7,000	+ 1,000
,, Sweden	10,000	80,000	+ 70,000
Electrical machinery, other.—			
From Great Britain	24,000	33,000	+ 9,000
,, United States	—	1,000	+ 1,000
Electrical material, other.—			
From Great Britain	11,000	12,000	+ 1,000

THE FARADAY SOCIETY.

Several papers of electrical interest were presented at the meeting of the Faraday Society held on June 26th, three of which are abstracted below.

The Electrolytic Effect of Alternating Superimposed upon Direct Currents.

Perhaps the most interesting was Mr. W. R. Cooper's account of a recent experimental investigation of the above subject. Hitherto this has attracted the attention of but three of four investigators, who have observed in a general way that some electrolytic reactions can be carried out at a lower voltage or more intensively by the superimposition of alternating on the effective direct current. Mr. Cooper has gone about the matter in a more systematic fashion, and he classifies his experiments not only as whether low frequency or high frequency currents were utilised but also depending upon the relative magnitudes of the two forms of current. Obviously, these can be such that the resultant is a unidirectional current of ripple form, or the current may during a smaller or greater part of the period be reversed in direction. The simple arrangement used in the case of low frequency currents is shown in fig. 1.

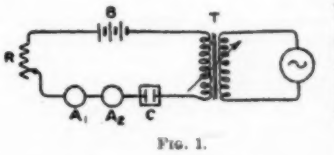


Fig. 1.

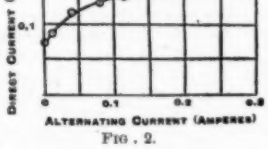


Fig. 2.

A_1=hot wire ammeter. A_2=moving coil ammeter. B=battery. C=electrolytic cell. R=variable resistance. T=transformer with variable coupling.

Fig. 1.—Arrangement For Low Frequency Currents. (Frequency 50).

Fig. 2.—Showing Variation of Direct Current With Superimposed Alternating Current. Low Frequency. Electrodes 0.41 mm. Platinum Wire in Dilute Sulphuric Acid.

It is clear that the ammeter A_1 measures the total current and A_2 the direct current only. The battery employed had a capacity of about 30 ampere-hours. The direct current was varied by adjusting R, and the alternating current by altering the distance between the coils of the transformer T.

In most of the experiments the electrolytic cell consisted of platinum electrodes in dilute sulphuric acid, and in all the cases mentioned above (defined by the relative magnitude of the direct and alternating currents) it was found that the

superimposed a.c. increased the magnitude of the d.c. Since this occurs even when the resultant current wave is in the form of a uni-directional ripple, the earlier explanation of the phenomenon, as due to the wiping out of polarisation effects, is clearly untenable.

The magnitude of this curious effect, of course, varies with the relative values of the two currents, but the accompanying diagram, fig. 2, illustrates the kind of effect produced. It will be noted that the increase in the d.c. reaches a maximum as the a.c. increases.

The effect only passes off some minutes after the a.c. is switched off, and the greatest sensitiveness is obtained when the voltage applied to the cell is below that of decomposition. The effect was obtained, with some differences in its magnitude, when one electrode was a wire and the other had a much larger surface.

In order to throw light on the cause of this curious phenomenon, Mr. Cooper made microscopical observations of the electrodes during electrolysis, and it was noticed that the whole of the hydrogen was at times absorbed by the cathode, while oxygen was freely given off at the anode. For example, in one case a current of over 1½ milliamperes passed before hydrogen was noticeable, although the application of high frequency a.c. at once caused evolution of hydrogen. This observation, however, does not seem to bring us nearer to an explanation of the effect.

The experiments were repeated with high-frequency currents with much the same results, excepting that when the applied d.c. voltage was below the decomposition voltage the effect of the high frequency current was much less than that of low frequency.

The phenomenon here discussed is utilised in the electrolytic detector for wireless telegraphy, but in this case one fine wire is used just dipping into the electrolyte. Mr. Cooper reproduced these conditions, using a large piece of platinum foil as the second electrode. If, under these conditions, the applied voltage is sufficient to cause a ready evolution of bubbles, the application of a small high frequency current scatters the bubbles, repelling them from one another as if they were electrified, and the direct current at the same time rises. Possibly the same effect takes place with the larger electrodes.

Another curious phenomenon was observed which does not appear to have been noticed before. If the applied d.c. voltage be reduced until only one or two minute bubbles form on the wire electrode and then a small high frequency current is passed momentarily, a large hemispherical bubble forms over the electrode, and this whether it be anode or cathode. This bubble starts its formation from the body of the electrolyte, appearing to start some 3 mm. below the electrode, and travelling very fast and taking up its position with unerring accuracy. The bubble is very large compared with those formed by electrolysis and its appearance suggests something in the nature of an electric discharge.

The Electrical Conductivity of Hydrochloric Acid and Potassium Chloride in Presence of Sucrose.

Mr. A. J. Kieran contributed an account of a research on the above subject, which arose from an attempt to determine whether sucrose in aqueous solutions was capable of forming a permanent union with the hydrogen ion. It was found that while the behaviour of KCl in the presence of sucrose is normal, in that the equivalent conductivity increases regularly with increasing dilution of the salt to an asymptotic limit, the behaviour of HCl is abnormal, the equivalent conductivity passing through a maximum and then steadily falling with increasing dilution. This was found not to indicate replacement of the fast-moving H ion by a slow-moving complex, but to be due to traces of impurity present in even the purest sucrose obtainable.

The nature of this fortuitous abnormality is considered to be not without interest in view of the close association of minute amounts of electrolytes with other organic substances of high molecular weight.

The Distribution of Colloidal Particles in Suspension.

Prof. Perrin, some years ago, examined experimentally the distribution of colloidal particles in suspension, and put forward a law of distribution, which he also deduced theoretically, analogous to that which characterises the distribution of the molecules in the atmosphere. Perrin's observations, however, were made in very dilute solutions, and Prof. E. F. Burton has shown that his law gives impossible values for concentrated solutions. Prof. A. W. Porter and Mr. J. J. Hedges in their paper described experiments made with suspensions of gamboge over a wide range of depths, and, therefore, concentrations, and they prove both experimentally and by calculation that the concentration tends to uniformity as the depth increases. In fact, the law of change with increasing concentrations does not follow the perfect gas equations as it does in the dilute suspensions examined by Perrin.

The paper describes in some detail the apparatus and method used for counting the particles at different depths. In the mathematical calculation the authors incidentally controvert Burton's view that the known distribution of colloidal particles requires the assumption of repulsive forces arising from the electrical charges on the particles. This view neglects the double layer of equal and opposite charges close to the surface of each particle.

THE X-RAY AND RADIUM PROTECTION COMMITTEE.

General Recommendations.

The question of the degree of protection offered by different "protective" appliances used in connection with X-ray installations has recently excited much public attention and anxiety. The X-ray and Radium Protection Committee, which issued a preliminary report on the subject, dated July 30th, 1921, has made certain specific recommendations that are being widely acted upon—and not prematurely, for there can be little doubt that the majority of the X-ray installations in this country are deficient from the point of view of protection. Stray radiations can generally be found in abundance throughout X-ray rooms, and such conditions are calculated to ultimately lead to detrimental effects on the operators.

It is therefore of interest to note that in his annual report for 1921 the director of the National Physical Laboratory records that that institution has agreed to examine, on request, X-ray installations in accordance with the suggestions that have been made by the above-named Committee. The inspection arrangements include measurements of the stray radiation, and tests of the individual protective appliances which are in use. Attention is also paid to general considerations, such as ventilation, electrical arrangements, and the lay-out of the installations, with special reference to the safety of the operator, and in every case advice is given on such points as may arise out of the laboratory inspection. Similar inspection facilities are provided for radium workers. On account of the importance of the subject, the recommendations of the "Protection Committee" are summarised hereunder:—

The danger of over-exposure to X-rays and radium can be avoided by the provision of efficient protection and suitable working conditions. The known effects on the operator to be guarded against are:—

1. Visible injuries to the superficial tissues, which may result in permanent damage.
2. Derangements of internal organs and changes in the blood.

These are especially important, as their earlier manifestation is often unrecognised, and the following precautions are recommended:—

1. Not more than seven working hours a day.
2. Sundays and two half-days off duty each week, to be spent as much as possible out of doors.
3. Annual holiday of one month or two separate fortnights.

Sisters and nurses, employed as whole-time workers in X-ray and radium departments, should not be called upon for any other hospital service.

The protective measures recommended are dealt with under seven sections, but it must be clearly understood that the protective measures recommended for these various purposes are not necessarily interchangeable; for instance, to use for deep therapy the measures intended for superficial therapy would probably subject the worker to serious injury.

I. *Diagnostic Purposes.*—In the case of screen examinations—

(*a*) The X-ray bulb to be enclosed as completely as possible with protective material equivalent to not less than 2 mm. of lead; the material of the diaphragm to be equivalent to not less than 2 mm. of lead.

(*b*) The fluorescent screen to be fitted with lead glass equivalent to not less than 1 mm. of lead, and to be large enough to cover the area irradiated when the diaphragm is opened to its widest. (Practical difficulties militate at present against the recommendation of a greater degree of protection.)

(*c*) A travelling protective screen, of material equivalent to not less than 2 mm. of lead, should be employed between the operator and the X-ray box.

(*d*) Protective gloves to be of lead rubber (or the like) equivalent to not less than ½ mm. of lead, and to be lined with leather or other suitable material. (As practical difficulties militate at present against the recommendation of a greater degree of protection, all manipulations during screen examination should be reduced to a minimum.)

(*e*) A minimum output of radiation should be used with the bulb as far from the screen as is consistent with the efficiency of the work in hand; screen work to be as expeditious as possible.

In the case of radiographic examinations ("overhead" equipment)—

(*a*) The X-ray bulb to be enclosed as completely as possible with protective material equivalent to not less than 2 mm. of lead.

(*b*) The operator to stand behind a protective screen of material equivalent to not less than 2 mm. of lead.

II. *Superficial Therapy.*—It is difficult to define the line of demarcation between superficial and deep therapy. For this reason it is recommended that, in the reorganisation of existing, or the equipment of new, X-ray departments, small cubicles should not be adopted, but that the precautionary measures suggested for deep therapy should be followed. The definition of superficial therapy is considered to cover sets of apparatus giving a maximum of 100,000 volts (15 cm. spark gap between points; 5 cm. spark gap between spheres of 5 cm. diameter).

Where the cubicle system is already in existence it is recommended that:—

1. The cubicle should be well lighted and ventilated, preferably provided with an exhaust electric fan in an outside wall or ventilation shaft; the controls of the X-ray apparatus to be outside the cubicle.
2. The walls of the cubicle should be of material equivalent to not less than 2 mm. of lead; windows to be of lead glass of equivalent thickness.
3. The X-ray bulb should be enclosed as completely as possible with protective material equivalent to not less than 2 mm. of lead.

III. *Deep Therapy.*—This section refers to sets of apparatus giving voltages above 100,000.

1. Small cubicles are not recommended.
2. A large, lofty, well-ventilated and lighted room to be provided.
3. The X-ray bulb to be enclosed as completely as possible with protective material equivalent to not less than 3 mm. of lead.
4. A separate enclosure to be provided for the operator, situated as far as possible from the X-ray bulb. All controls to be within this enclosure, the walls and windows of which to be of material equivalent to not less than 3 mm. of lead.

IV. *Industrial and Research Purposes.*—The preceding recommendations for voltages above and below 100,000 will probably apply to the majority of conditions under which X-rays are used for industrial and research purposes.

V. *Electrical Precautions.*—The following recommendations are made:—

1. Wooden, cork, or rubber floors should be provided; existing concrete floors should be covered with one of the above materials.
2. Stout metal tubes or rods should, wherever possible, be used instead of wires for conductors; thickly insulated wire is preferable to bare wire; slack or looped wires are to be avoided.
3. All metal parts of the apparatus and room to be efficiently earthed.
4. All main and supply switches should be very distinctly indicated; wherever possible double-pole switches should be used, and fuses no heavier than necessary for the purpose in hand should be used; unemployed leads to the high-pressure generator should not be permitted.

VI. *Ventilation.*—It is strongly recommended that the X-ray department should not be below the ground floor.

The importance of adequate ventilation in both operating and dark rooms is supreme. Artificial ventilation is recommended in most cases. With very high potentials coronal discharges are difficult to avoid, and these produce ozone and nitrous fumes, both of which are prejudicial to the operator. Dark rooms should be capable of being readily opened up to sunshine and fresh air when not in use. The walls and ceilings of dark rooms are best painted some more cheerful hue than black.

VII. *Radium Therapy.*—The following protective measures are recommended for the handling of quantities of radium up to one gramme:—

1. In order to avoid injury to the fingers the radium, whether in the form of applicators of radium salt, or in the form of emanation tubes, should always be manipulated with forceps or similar instruments, and it should be carried from place to place in long-handled boxes lined on both sides with 1 cm. of lead.
2. In order to avoid the penetrating rays of radium, all manipulations should be carried out as rapidly as possible, and the operator should not remain in the vicinity of radium for longer than is necessary.

The radium when not in use should be stored in an enclosure, the wall thickness of which should be equivalent to not less than 8 cm. of lead.

3. The handling of emanation should, as far as possible, be carried out during its relatively inactive state. In manipulations where emanation is likely to come into direct contact with the fingers thin rubber gloves should be worn. The escape of emanation should be very carefully guarded against, and the room in which it is prepared should be provided with an exhaust electric fan.

In view of the varying susceptibilities of workers to radiation, the Committee recommends that wherever possible periodic tests, *e.g.*, every three months, be made upon the blood of the personnel, so that any changes which occur may be recognised at an early stage. In the present state of knowledge it is difficult to decide when small variations from the normal blood-count become significant.

Sale of White City.—The proprietors, Shepherd's Bush Exhibition, Ltd., announce that the 100 acres of exhibition ground, with buildings, is offered for sale by private treaty.

THE INSTITUTION OF ELECTRICAL ENGINEERS.

Western Centre Summer Meeting.

The summer meeting of the Western Centre of the Institution was held on July 24th, and took the form of an outing. The members and their friends from both sides of the Bristol Channel assembled at Gloucester, trains from South Wales and Bristol being met by a fleet of charabancs, which conveyed them to Pittville Gardens, Cheltenham, where they were received by the Mayor (Miss Winterbotham, M.B.E.) and the chairman of the Cheltenham Electricity Committee (Councillor J. Moore). After luncheon the toast of "The Institution" was submitted by Coun. Moore, who humorously alluded to his early personal connection with the electrical profession, and paid tribute to the pertinacity of the electrical engineer in making his investigations of to-day the achievements of to-morrow. He wished the parent Institution every success in the future, and congratulated the Western Centre on the efforts it was putting forward to organise the electrical profession in the West of England and South Wales.

Mr. A. C. MacWhirter, in replying, stated they were proud of their Institution, and he was proud to be the chairman of the Western Centre. The Institution had a war record of which it was very proud; many of the effective inventions produced during that period emanated from its members. The toast of "The Mayor and Corporation of Cheltenham" was proposed by Mr. A. C. MacWhirter and responded to by the Mayor, who, in the course of a very graceful speech, said how pleased she was to welcome members of the Western Centre to Cheltenham. She congratulated the Institution on two points—the granting of the Royal Charter and the attainment of its jubilee, and the Western Centre on the inclusion of ladies for the first time in its annual summer meeting.

Mr. W. A. Chamen submitted the toast of "The Visitors and Ladies," which was responded to by Mr. A. S. Barnard (chairman of the North-Western Centre), who stated that his Centre could boast of two lady members, both of whom attended their meetings and sometimes spoke.

The I.E.E. Western Centre at Cheltenham.

After luncheon a visit was paid to the works of the Erinoid Co., at Stroud, the route taken by the charabancs being *via* Leckhampton, Birdlip, Cranham Woods, and Painswick. The process of manufacture of "Erinoid" was a source of great interest, especially as it is an industry captured from the Germans, and therefore new to most people. The spacious premises and its complete plant and equipment was a surprise, and quite in keeping with its beautiful surroundings. The return journey was made *via* the Slad Valley to Birdlip, where tea was partaken of. A hearty vote of thanks was accorded to Mrs. Corson and Messrs. Corson, Bache, Hood, Nairn, Langdon, Ostler and Allam, the Sub-Committee responsible for the working out of the details which ensured such an enjoyable outing to all those who participated. From Birdlip the journey was made back to Gloucester, where some members returned by the earlier trains to Bristol and South Wales, the remainder of the party paying a much appreciated visit to the cathedral.

During luncheon the annual meeting was held, the business of which comprised two items only. The declaration of the ballot for new members of the Committee showed that Messrs. Heath, Rogers, Sully and Fidoe were "placed." Hearty votes of thanks were accorded the South Wales Institute of Engineers and the governors of the Merchant Venturers' Technical College, Bristol, for the use of meeting rooms during the past session.

NEW ELECTRICAL DEVICES, FITTINGS, AND PLANT.

Readers are invited to submit particulars of new or improved devices and apparatus, which will be published if considered of sufficient interest.

The Brolt Neon Spark Gauge.

Correct ignition is an essential factor to the satisfactory working of all types of automatic and aero engines. Until comparatively recently there was no instrument available for testing the state of operation of a sparking plug under normal working conditions, but the Brolt neon spark gauge has been designed for this purpose.

The gauge—without "short-circuiting" or any other process liable to impair the efficiency of the magneto—utilises a very small amount of its energy to produce a luminous discharge of sufficient colour value to demonstrate, by day or night, the precise condition of the sparking plugs. The bright red glow is obtained by an electrical discharge through a tube containing neon gas.

The Brolt gauge, fig. 1, consists of four components:—

The ebonite container is a moulded tube of high insulating capacity, having an aperture through which the luminous discharge can be seen. The neon tube is about 2½ in. long and ¼ in. diameter, and is somewhat constricted in the centre in order to increase the brilliancy of the discharge. Nickel electrodes are sealed in at either end, and to each is attached a connecting wire.

The steel wool at each end of the tube serves a dual purpose; it forms a resilient packing for fixing the neon tube into the ebonite container, and is the conducting medium by which the current is conveyed through the electrodes. A brass cap secures the tube in position, and forms the contact base of the spark gauge.

When the cap of the gauge is brought into contact with the sparking plug it is influenced by the oscillatory discharge

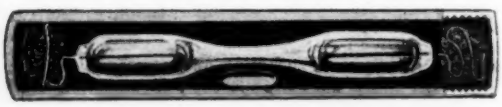


Fig. 1.—Sectional View of Neon Spark Gauge.

from the magneto whenever a spark passes in the ordinary course of ignition. A minute amount of energy passes through the neon tube and from thence to the ebonite case and through the hand of the operator to earth. In effect, therefore, the appliance resembles a miniature condenser in its method of operation. At the normal working the potential of the plug is sufficient to cause a red flash, and the rate and evenness of firing can thus be observed. Should the plug have become "fouled" or carbonised, or alternatively, if the points are too close, the potential is immediately reduced (either because of leakage or insufficient gap) and the neon tube will in these circumstances only flash feebly or intermittently. If the points are too far apart (*i.e.*, too large a spark gap) the potential is raised and the flash will become lurid in colour. Thus the motorist is enabled to visualise the spark operation from his plugs while the engine is still running.

The gauge may also be used for testing the continuity of the electrical circuit, and for locating any leakage which may occur in connection with the h.p. leads by simply placing the gauge along the outer covering.

The neon gauges are being manufactured for Messrs. Brolt, Ltd., of Rood End Road, Oldbury, in large quantities by Messrs. Siemens Brothers & Co., at their Dalston lamp works.

The "Utility" Toaster-Fire.

A triple-purpose electric fire has recently been put upon the market by Electrical Utilities, Ltd., 1-3, Shelgate Road, S.W.11. It consists of zig-zag spiral elements mounted in a

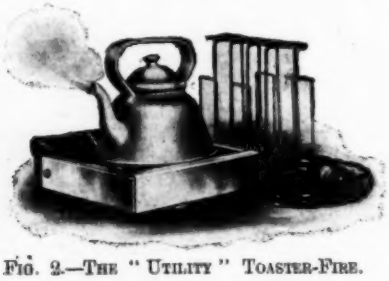


Fig. 2.—The "Utility" Toaster-Fire.

rectangular aluminium frame upon an enamelled cast-iron base, a polished aluminium reflector, and a wire frame which fits over the element frame as shown in the illustration (fig. 2). Without the wire frame the device can be used as a radiator, the reflector being placed in position behind the elements. The frame converts it into a toaster, and, if desired, the heater can be laid flat, resting upon a foot forming a part of the reflector for the purpose of boiling a kettle. The loading is only 550 W, suitable for various voltages, and two yards of flex, with an adaptor are provided.

The "Lawrence" Heater-Softener.

The Lawrence Patent Water Softener and Sterilizer Co., Ltd., Parliament Mansions, Victoria Street, S.W.1, has produced an apparatus which combines in one plant the processes of softening and heating boiler feed-water. This appliance removes the carbonate hardness from the water and at the same time raises the temperature to about 210 deg. F. The illustration (fig. 3) shows the arrangement, and the action is briefly as follows:—Hard cold water is admitted by a

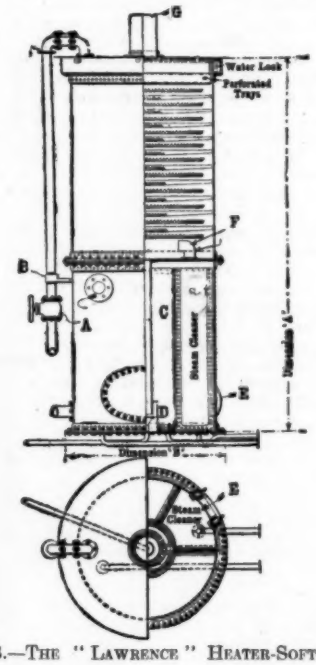


Fig. 3.—The "Lawrence" Heater-Softener

control valve and is divided into fine streams by special perforated water-locked trays and "locator" plates. Exhaust steam enters a self-contained steam cleaner and is specially distributed so as to obtain an intimate admixture of steam and water. The lower part of the heater acts as a settling tank from which the hot softened water is delivered into a storage tank, or directly, by pump, into the boiler. The deposit is collected on the "locator" plates, which are easily removable for cleaning without dismantling the apparatus. A special pattern has been designed for utilising exhaust heat from gas and oil engines instead of steam.

The "Chad" Wireless Battery.

Messrs. Fuller's United Electric Works, Ltd., Woodland Works, Chadwell Heath, E., have produced a special type of battery for energising the anode circuits of thermionic valves

Fig. 4.—The "Chad" Wireless Battery—Single Cell.

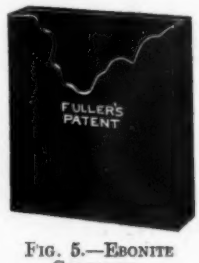


Fig. 5.—Ebonite Container.

for wireless reception purposes. This consists of eight cells, similar to that illustrated in fig. 4, connected together in series. These cells have a very high internal resistance, enabling them

to remain unused for long periods without deterioration. The electrodes are encased in an ebonite container (fig. 5), securing immunity from leakage from one cell to another. The assembled battery measures only 3¾ in. by 2 in. by 2¼ in., and has an e.m.f. of 12 V. The normal rate at which current is taken from the battery is about 3 mA; it is therefore recommended that, when possible, but particularly when two or more valves are used in "cascade," sets of batteries should be connected up in parallel to ensure more economical working.

ELECTRICITY AND SANITARIANS.

If there is any particular function in connection with the electricity supply industry which Mr. C. H. Wordingham has not exercised at some time or other, it would be interesting to hear of it.

Recently his attention has been directed a good deal towards the commercial aspect of the business, and he has not found it impossible to combine with the work of planning power stations, the no less necessary thought and initiative required to create new markets for their output.

At the instigation of an organisation with which we are all familiar Mr. Wordingham addressed the Conference of the Royal Sanitary Institute recently held at Bournemouth in a most interesting manner. It appears from examination of the papers issued by this influential body that the Bournemouth meeting was the 33rd in its history, and one may safely hazard a guess that it was the first at which the important relation between electricity and health had received attention.

Mr. Wordingham, who entitled his paper "The Brightening of the Home and the Lightening of Domestic Labour by Electrical Means," covered rapidly and clearly the principal applications of electricity to domestic work, and put before the meeting a few pertinent considerations which should by now have been made commonplaces in the public mind by those interested in the progress of the industry.

The speaker pointed out with regard to electric lighting that the price of the kWh was hardly worthy of consideration, its incidental savings and advantages being so great that it was practically a gift. He drew particular attention to the relation between electric heat and power in the home and the still diminishing supply of domestic service available in most places, showing how electricity helped in the difficult position caused by the shortage of servants, and might even go a long way to remedy that shortage by making them more comfortable in their work and giving them a feeling of increased status by removing drudgery and placing in their hands tools much superior to those to which they had been accustomed. He recommended the architect to consult with the electrical engineer, and everybody interested in the production and maintenance of homes and their equipment to consult with the "Housewife."

Mr. Wordingham is evidently seized with the urgent necessity for providing the more expensive pieces of electrical apparatus on hire or hire-purchase terms, and goes so far as to say that the time is ripe for the formation of well-financed companies to carry on this work, as is already done with many other home appliances desirable to everyone, but under present conditions difficult to pay for outright. Companies handling a big hiring business would be in a very strong position with regard to buying apparatus and standardising it.

The speaker, in concluding, referred to the necessity of simpler tariffs, easily understandable and designed to encourage the wider use of electricity.

In the discussion which has taken place in one of our leading daily papers with regard to the troubles of the gas consumer the leader writer remarks that: "The electricity meter still talks plain English"—this really may be taken as a motto for the framer of electricity tariffs. Many have already lost opportunities by putting forward charges, probably just and scientific, but too complex in detail and also by omitting to advertise their service or take the public into their confidence as they should have done.

It is reported that the discussion following Mr. Wordingham's paper was something more than brisk and that the disgruntled ones received from the author something almost more than plain speaking. One can only feel grateful to a busy man for taking the trouble to do this valuable work. In the electrical industry there is no desire, and never has been any desire, to take unfair advantage of powerful and valuable rival services, but there have been examples, by no means universal, where distinctly unfair tactics have been adopted to belittle the possibilities of electricity; in fact, the advertising of some of its competitors consists more in describing the alleged inefficiencies of electricity than in praising their own commodities.

Only recently circulars have come into our hands intended to push the claims of various kinds of solid fuel, or the apparatus for consuming them, and apparently the writers of these circulars could find no better argument than to draw comparisons between the costs of various kinds of fire burning raw fuel and the cost of using electric stoves for 16 or 20 hours a day at prices per kWh which would almost make them impossible for the briefest and most occasional work.

If competing methods of heating, lighting and cooking require to be pushed by comparisons with electricity at rates and for a manner of use which no sane person would adopt, it is pretty obvious that some of our competitors are viewing the progress of this industry with very great alarm.

An interesting impression which one carried away from this meeting is the receptivity of the medical man with regard to electricity—it was obvious in the discussion that little enough had been done to assist the doctor to understand what electricity can do in the home and how questions of cost and correct method of use affect it. At the same time it is obvious that the medical man is looking forward eagerly to the wider use of electric power and will welcome information and assistance from supply engineers and manufacturers.

In looking through the local papers some difficulty was found in discovering any reference to this particular meeting, and to the lively discussion arising from it, although much space was given to the Conference generally and to most of the subjects dealt with—it is true that in one column the title of the paper was printed with the exception of the words "by electrical means," but beyond that the only item in the local journal turning one's attention to electricity was the frequent reproduction of an advertisement referring to the pure air of Bournemouth which, apparently, is not so much due to the sea and to the pine trees as to the use of gas; this advertisement carried a statement that in the town there are 50,000 gas fires and 30,000 cookers operated by the same medium, so that there really seems to be quite a little business in front of the Bournemouth electricity supply undertaking, and it would be rather interesting to have a glimpse of the electrical position of Bournemouth at the time when the Royal Sanitary Institute is due to hold its Conference there once more.

It is obvious that conventions of this kind offer a most valuable opportunity to the electrical industry—it is possible in nearly all cases to put forward papers of interest and give information, quite apart from any advertising, which is welcomed gladly by the mixed bodies attending such meetings.

In connection with the Congress a small exhibition was held, and here again electricity was quite well represented, a good display being put up by the local electricity supply undertaking, and also by Messrs. Hoover, Rawlplng, and the Electric Appliance Co., Ltd., of Bournemouth.

REVIEWS.

The Beama Technical Cable Code. Imperial 4to (15 x 11 in.); 206 pp. London: The British Electrical and Allied Manufacturers' Association. Price £5 5s. net; packing, postage extra; inland 2s. 6d.; foreign 5s.

Notwithstanding the large number of telegraph codes already on the market, there is still room for a more complete technical code. Hitherto it has been customary for firms, whether manufacturers or merchants, to compile codes to meet their own particular requirements, and there is no question that these private codes, adapted as they are to a particular firm's specialities, and method of transacting business, will continue to be used. The British Electrical and Allied Manufacturers' Association, in catering for its members, among whom are manufacturers in every branch of the electrical and engineering trades, has endeavoured to produce a work which will not only standardise the private codes of its members, but will be also available for those other firms which feel the want of a special technical and engineering code.

The Beama Cable Code is beautifully printed on strong paper, and bound in a Kalamazoo loose-leaf binder, with the advantage that subscribers may insert fresh sections as they are published. Its contents have been compiled by Mr. John F. Shipley, M.I.E.E., who has had the assistance of the technical and commercial specialists connected with the firms in the Association, and this is itself a guarantee that the subject matter is reliable and complete. The phrases employed in the book are such as are frequently used in cabling inquiries, tenders and contracts, and they have been made as comprehensive as possible, and should meet the wants of the engineering trade. There are one or two errors in coding in Examples 8 and 9.

The Beama Cable Code is divided into 96 sections, each having an indicator, consisting of two letters ranging from AC to YR. Every section is carried out in a number of appropriate items, or tables of details, making each section complete in itself. Four of these sections consist of EP, commercial phrases (general engineering); ER, commercial phrases (details); ES, miscellaneous phrases; ET, technical phrases; 26 deal with figures—quantities, prices, and the like; and the remaining 66 sections are devoted to technical and electrical engineering matters, including accessories, batteries, condensers, cooling water apparatus, dynamos and motors, Diesel engines, gas and oil engines, steam engines (high speed and low speed), heating and cooking apparatus,

industrial instruments, scientific and telegraphic instruments, meters, centrifugal pumps, rotary converters, switch gear, transformers, turbines, turbo-generators, boilers, cranes, water turbines, electric vehicles, air compressors, electric furnaces, lifts, hydraulic pipe lines, electric traction (cars, locomotives and permanent way), transmission lines, cables, lamps, and a number of small apparatus. From this list it will be seen that the claim made in the introductory chapter is justified, *viz.*, "that the code should enable the export members of the Association to telegraph practically everything arising in the ordinary course of their highly-technical business, even to the extent of telegraphing a whole specification in detail."

The Beama Code is based upon the well-known lettered table system; that is to say, the subject matter is suitably arranged in sections, each section containing a sequence of appropriate tables relating to the subject of the section. Each section is provided with a two-letter indicator AC, AD, AF, &c. Similarly, each detail in the item tables bears code letters. To code a message the two letters indicating the section are first taken, and to these are added letters obtained from one detail in each of the Item Tables of the section indicated. The code letters are then formed into the usual ten-letter code-words, which, in the Beama Code consist of five two-letter vowel-consonant syllables.

In theory the system described appears both simple and economical; in practice, however, several disadvantages present themselves and affect the simplicity and safety of the system. Some pretentious codes based on this system have been published, but have met with poor success, probably owing to the difficulty of finding phrases when arranged in tabular form, the fact that a check is necessary when employing built-up code words, and the added complication as compared with the use of self-checking five-letter code words. Had five-letter code words been made use of in the Beama Code the tables then would have had figure instead of letter indicators.

The Beama Code contains a most valuable amount of skilfully-arranged technical matter not hitherto to be found in a published code, and a good index is provided to facilitate the finding of the matter required. Further, as the code caters for the highly technical trade of engineering, it will doubtless be used by trained men, and not by the ordinary cable clerk. This is in its favour, but even a qualified engineer will find it somewhat of a task to have to conform to the 25 rules which are thought to be necessary for coding and decoding messages. About half of these rules refer to the use of ciphers for modifying the method of coding. Generally, the procedure is as already described, *viz.*, a two-letter indicator denoting the section is taken, to which are added the necessary code letters of the details from each Item Table. Should it be required to omit a detail from any Item Table, then one of the "Pass Ciphers" A, B, AB, or AH is coded to denote this. It is, however, often desirable to take two or more details from the same Item Table, and for this purpose a "Repeating Cipher AX," or a "Double Repeating Cipher OH" is provided. Having once used the AX or the OH Cipher it becomes necessary to indicate in the message that the repetitions cease, and for this purpose the "Stop Repeating Cipher EX" is required. Again, to gain economy, it may be desirable to pass from one Item Table to another Item Table in the same section. To accomplish this the "Bridge Cipher UX" must be employed. Further, it may be necessary to interpolate a maker's code word, or a sentence from another code, when the "Private Code Cipher IH," or the "Code Switch Cipher IX" is required. Should the message then continue from the Beama Code this must be indicated by the use of the "Code-Return Cipher EH," and so on. The following example, taken from the code, shows that great care is necessary in coding and decoding when the modifying ciphers are employed:—

Example 12.

Index cipher	YP	water turbines (detailed).
Bridge cipher	UX	(Q2).
Q2	AV	Item 14.
Repeating cipher	OH	——
Item 14	O	bucket separate from impulse wheel.
Item 15	J	of cast steel plates, steel blades.
Item 14	E	alternatively.
Item 15	G	material of wheel, cast steel.
Item 14	A	(pass).
Item 15	N	material of buckets.
Stop-section cipher	OX	——
Index cipher	AK	(materials Q6).
Item 1	AL	alternatively.
Repeating cipher	AX	——
Item 2	AW	aluminium bronze.
Item 2	EC	delta bronze.
Stop-section cipher	OX	——
Index cipher	YP	(water turbines).
Bridge cipher	UX	——
Q2	AZ	Item 16.
Item 17	A	(pass).
Item 16	K	two wheels, two jets each.

It will be observed that the modifying ciphers are most useful, if indeed not indispensable, in letter table codes; but they greatly complicate the work of coding and decoding messages and, to some degree, affect the most important question of all, *viz.*, *safety*.

In all codes, and particularly in those in which the subject matter or meaning of the message is dependent upon the preceding code word or indicator, it is most desirable—nay, necessary—that each code word should have some safe method of check upon the accuracy of the code words received. There are two reasons for the preference shown for five-letter code words; they are simple in use, and having a two-letter difference in five, if properly selected, they are reasonably safe. In the introductory chapter it is truly stated that "few cables arrive without mutilation." These mutilations or errors, for the most part, are caused by the changing, or dropping, of a dot or dash, or by faulty spacing in the Morse signals, in transit. In code words built up from tables, practically every combination of letters is employed, notwithstanding that many of them are dangerously alike, and they therefore hold out many possibilities of error from the causes enumerated. For instance, AB may be received as AC, AD, AH, AS, AX, AZ, EB, IB, or UB; AC easily becomes AB, AF, AK, AR, AY, E.C, IC, or UC; and so on throughout the whole of the vowel-consonant syllables. Should such mutilations occur, and they frequently do, unless there is some method of detection it is obvious that a code word—or may be the whole of the following code words—would be wrongly interpreted with disastrous consequences. At any rate, a prudent user of the Beama Cable Code would insist upon using a check for testing the accuracy of all code words received. A check system is provided for this purpose, but it is not suggested that its use is imperative, because a Check Indicator YX is provided to show when message is subjected to a check. Here, again, YX when telegraphed is liable to be received as YD, and YD is the indicator of the section for electric traction. As the same vowel-consonant letters are employed as section indicators for the code letters of details and for the modifying indicators, all of which are subject to mutilation, as already shown, it would appear that the checking device should be insisted upon in all messages. Here we see a disadvantage of the letter table system, for not only does a system of checking introduce its own complications but, in the Beama Code, it also reduces the economy at once by 20 per cent. There is a known and simple method of checking in existence which would dispense with the check indicator YX, and would take nothing whatever from the economy of the code words. The following example from the code will explain the method of employing the Beama Check:—

Example 13.

Index cipher	EP	(commercial phrases).
Item 1	AC	(go direct to item 6).
Item 6	AK	quote by telegram price and delivery for.
Item 7	AC	one.
Item 8	EB	delivered to site and erected, including all foundation work, but excluding import Customs duties.
Stop-section cipher	OX	——
Index cipher	IM	(cooling towers).
Item 1	O	natural draught type.
Item 2	D	principle left to you.
Item 3	AF	chimney construction.
Item 4	I	water capacity in imperial gallons per hour.
Item 5	C	(Q1).
Item 1	AD	(read from Items 3, 4 and 5 only)
Item 3 (Q1)	EJ	20
Item 4 (Q1)	AC	00 } 200,000.
Item 5 (Q1)	AC	00 }
Item 6	E	average inlet temperature.
Item 7	G	in degrees F. (Q2).
Q2	YP	95
Item 8	I	to be cooled to lowest economic pressure.
Item 9	B	(pass).
Item 10	E	average air temperature.
Item 11	G	in degrees F. (Q2).
Q2	ON	60.
Item 12	AC	relative humidity in per cent. (Q2).
Q2	UB	80.
Item 13	AK	shape of cooler, rectangular.
Item 14	A	(pass).
Item 15	B	(pass).
Item 16	AC	height of water inlet above tank top in feet (Q2).
Q2	EF	20.
Item 17	AB	(pass).
Repeating cipher	AX	——
Item 18	EG	include.
Item 18	AD	all bolts, nuts, screws and rivets for re-erection on site.
Stop-section cipher	OX	——

(i) Prefix the check cipher YX to the message to show that it is to be checked; it will then read thus:—

YXEPACAKACEBOXIMODAFIC
ADEJACACEGYPIBEGONAC
USAKABACEFABAXEGADOX

(ii) Split the message into 8-letter segments, thus:

YXEPACAK ACEBOXIM ODAFICAD EJACACEG
YPIBEGON ACUSAKAB ACEFABAX EGADOX.

(iii) Take from Schedule 1 the numerical value of each of the four syllables of a segment, double the total numerical value of each four syllables, and draw its value cipher from Schedule 2. The following will be the result:—

YX	EP	AC	AK				(Value cipher)
1	5	2	8	16.	16 × 2	32	OJ
AC	EB	OX	IM				
2	3	6	5	16.	16 × 2	32	OJ
OD	AF	IC	AD				
9	4	6	3	22.	22 × 2	44	UB
EJ	AC	AC	EG				
9	2	2	7	20.	20 × 2	40	OW
YP	IB	EG	ON				
4	5	7	8	24.	24 × 2	48	UF
AC	US	AK	AB				
2	4	8	1	15.	15 × 2	30	OF
AC	EF	AB	AX				
2	6	1	9	18.	18 × 2	36	OR
EG	AD	OX					
7	3	6		16.	16 × 2	32	OJ

(iv) Add these value-ciphers to the corresponding 8-letter segments and thus compose 10-letter words.

YXEPACAKOJ ACEBOXIMOJ ODAFICADUB
EJACACEGOW YPIBEGONUF ACUSAKABOF
ACEFABAXOR EGADOXOJ.

In conclusion, the subject matter in the Beama Cable Code, as already pointed out, is all that could be desired for the purpose intended. The system upon which it is based, however, is somewhat complicated, and as the meaning of a message depends upon the correct receipt of the indicators and modifying ciphers, the employment of the check should be made compulsory in all messages. It is possible so to check messages without the loss of 20 per cent. economy necessitated by the use of the existing check system.

LEGAL.

Electric Lamp Globe Contract Dispute.

In the Mayor's and City of London Court, on July 28th, before Judge Jackson, Johnsen & Jorgensen Flint Glass, Ltd., claimed £59 against the British & Allied Electrical Agency, Ltd., Ely House, for white opal "Pixie" electric light globes supplied. Mr. Ronald Smith appeared for the plaintiffs, and Mr. Morgan May for the defendants. Mr. May said he wanted to take a preliminary point before the case was opened. The particulars of claim did not disclose any cause of action. The claim was for goods sold. Defendants wanted them for the *Daily Mail* Ideal Homes Exhibition, held in February, and asked plaintiffs to supply a certain number of globes. Plaintiffs had none in stock in London at the time, but they had at their disposal 110 gross of the same globes in Sweden. That did not quite meet defendants' wishes, they wanted them at once, and they did not want so many. They failed to do better elsewhere and they returned to the plaintiffs and said they were willing to take the 110 gross of globes. The first letter was sent on January 19th, when plaintiffs offered the globes at 10s. 9d. per gross. That letter said "awaiting your confirmation, delivery understood to be within four weeks here." Plaintiffs cabled to Sweden to dispatch the goods immediately, and they used all their endeavours to get the goods delivered at once. The conditions of sale were that delivery was to be as quick as possible without guarantee of any specific time. Defendants did not send a signed copy of the order as requested, and now said that they did not accept plaintiffs' terms as regarded delivery. Defendants wrote on February 2nd and said there were very few shipments from Kalman, where the goods were, and plaintiffs said they would send them from Gothenburg, which they did. The vessel by which they came first broke her rudder and was then ice bound, and arrived on February 22nd in London. The previous day defendants cancelled the order, and said that the delay had occasioned them a loss, as they had had to purchase elsewhere. That was a repudiation before the time specified for delivery, February 21st. Plaintiffs refused to cancel the order and asked for the address to which they were to send the goods and then sent the defendants a dozen samples of the globes, as the defendants intended to sell them elsewhere. In cross-examination, Francis Ellis, plaintiffs' manager, admitted receiving a letter of January 19th, which contained the words "within four weeks from the date of 'phone order," but they did not take any notice of that. They never undertook to deliver the goods definitely within four weeks. For the defence, Mr. Albert T. Pollock, one of the defendants' directors and a buyer, was called, and he detailed a conversation which, he said, he had with the plaintiffs' witness Ellis in fixing up the contract. He distinctly told the plaintiffs that it was imperative that the goods should be delivered within four weeks. Witness further said that he did his best to get the plaintiffs to deliver the goods within four weeks, but he did not succeed. He told the plaintiffs he did not desire to act strictly according to law, but was prepared to assist the plaintiffs in disposing of the goods when they could not deliver them in time. Then Ellis said plaintiffs could not take any responsibility for them, but they would store them for a period free of rent. Ellis said the plaintiffs would try to dispose of the goods themselves, and suggested that they should divide the loss, but that was never agreed to. Then they received samples of the bulk.

In giving judgment, the Judge said it was very hard on the defendants that the goods were not delivered in time for the exhibition, but he could not understand why the defendants had bought bulbs elsewhere on February 16th, when they had given the plaintiffs until February 21st in which to deliver the goods. He need not come to a definite conclusion on the contract because, rightly or wrongly, he considered the delivery of samples as delivery of part of the bulk. Therefore, judgment must be given for the plaintiffs with costs.

NEW PATENTS APPLIED FOR, 1922.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by Messrs. Sefton-Jones, O'Dell and Stephens, Chartered Patent Agents, 285, High Holborn, London, W.C. 1.

19,378. "Variable coupling and wave-length switch." B. F. J. Studd. July 14th.
19,379. "Electrical measuring instruments." K. Edgcumbe and E. T. Everett. July 14th.
19,380. "Lightning arresters." British Thomson-Houston Co., Ltd. (General Electric Co.). July 14th.
19,381. "X-ray apparatus." British Thomson-Houston Co., Ltd. (General Electric Co.). July 14th.
19,403. "Electrically-operated apparatus for advertising, &c." C. M. Brown and H. G. Cocks. July 14th.
19,411. "Manufacture of thermionic valves, &c." H. St. J. de A. Donisthorpe. July 14th.
19,427. "Winding devices for paying-out and winding-in electric conductors." N. D. G. Robertson, R. D. Stowell, and Wayne Engineering and Equipment Co., Ltd. July 14th.
19,430. "Manufacture of tungsten powder." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 14th. (Holland, July 20th, 1921.)
19,443. "Priming electric batteries." B. F. S. Baden-Powell. July 15th.
19,448. "Devices used in electric wiring systems." W. Osborn. July 15th.
19,468. "Wireless receivers." C. W. Green and G. Shaw. July 15th.
19,478. "Apparatus for taking up slack of flexible cable for electric irons, &c." J. H. Collie. July 15th.
19,496. "Electron-emitting cathodes and preparation of same." British Thomson-Houston Co., Ltd. July 15th. (United States, August 11th, 1921.)
19,497. "Electric motor control." British Thomson-Houston Co., Ltd., and R. D. Given. July 15th.
19,526. "Electric condensers." J. D. L. Bradwell and E. A. Reynolds. July 17th.
19,527. "Apparatus for ascertaining and indicating capacity of electric accumulator." P. J. Gumbley. July 17th.
19,528. "Sparking plug tester." G. W. Humphry and E. R. Humphry. July 17th.
19,531. "Electrophorus gas lighter." E. Zipperle. July 17th. (Germany, July 15th, 1921.)
19,532. "Couplers for electric tumbler switches." E. Wilcox. July 17th.
19,552. "Wireless receiving sets." J. B. Bignamy and H. R. Howling. July 17th.
19,560. "Generation of electrical oscillations by thermionic tubes." L. G. Preston and N. Shuttleworth. July 17th.
19,569. "Vacuum tubes, &c., for sparking plug indicators, &c." F. M. Denton. July 17th.
19,579. "Electrical switchboards." C. F. Atkinson. July 17th.
19,581. "Process for stabilising detector and reinforcing effect of electrolytic cells." D. Reichinstein. July 17th. (Germany, July 19th, 1921.)
19,595. "Automatic telephone system, and switching apparatus therefor." H. Baron (F. Aldendorff). July 17th.
19,597. "Telephone receivers." B. H. Morphy. July 17th.
19,600. "Ignition cables." H. Baechler. July 17th.
19,617. "Apparatus for electrolysis of water." L. Casale. July 17th.
19,625. "Apparatus for automatic connecting and disconnecting of electrical machine units." Akt. Ges. Brown, Boveri et Cie. July 17th. (Switzerland, September 10th, 1921.)
19,632. "Control of railway trains." W. J. Underwood. July 17th.
19,635. "Electrically-illuminated signs." J. Moiseiwitsch. July 17th.
19,641. "Wireless receivers." P. W. Baker. July 17th.
19,672. "Distributor brush and brush-holder for motor cars." M. M. Ward. July 18th.
19,687. "Five-electrode thermionic valve." W. E. E. Hare. July 18th.
19,696. "Electrically-illuminated signs, &c." J. Bacon. July 18th.
19,702. "Device for opening and closing electric circuits or contacts." W. H. Scott and A. Wyatt. July 18th.
19,705. "Means for connecting steps and sliding doors of tramcars, &c." S. Okabe. July 18th.
19,709. "Illuminated sign lamp." Internationalé Radiotelegraf and Telefon Compagni ved Wahnoe and Peters. July 18th. (Denmark, January 9th.)
19,720. "Electric heating apparatus." A. Boer. July 18th. (Switzerland, July 18th, 1921.)
19,722. "Internal-combustion engines." British Thomson-Houston Co., Ltd. (General Electric Co.). July 18th.
19,729. "Warning signal for ships' telegraphs." T. W. Mair. July 18th.
19,739. "Protective covering for submarine cables." Felten & Guilleaume Carlswerk Akt. Ges. July 18th. (Germany, July 18th, 1921.)
19,742. "Printing telegraph transmitting instrument." E. C. R. Marks (Morkrum Co.). July 18th.
19,743. "Printing telegraph receiving instruments." E. C. R. Marks (Morkrum Co.). July 18th.
19,756. "Electric lamp-holder." T. L. L. Bradbury and A. McLay. July 18th.
19,758. "Electrically-illuminated signs, &c." S. Fisher. July 18th.
19,760. "Telephone registers." J. Rest. July 18th.
19,766. "Thermionic tubes." E. K. Hunter. July 19th.
19,767. "Electrical installations for motor vehicles." R. Bosch Akt. Ges. July 19th. (Germany, June 12th.)
19,788. "Holders for thermionic valves." A. P. Welch. July 19th.
19,795. "Overhead trolleys for electric tramways, &c." G. P. Gill. July 19th.

19,800. "Electric flash light lamp." Aktiebolaget Birka Regulator. July 19th. (Sweden, September 30th, 1920.)
19,806. "Filament resistances for thermionic valves." A. P. Welch. July 19th.
19,832. "Shaft bearings." British Thomson-Houston Co., Ltd. (General Electric Co.). July 19th.
19,834. "Electrically-operated mining plant." W. A. Scott. July 19th.
19,842. "Insulating devices for wireless installations." S. L. Forbes. July 19th.
19,843. "Insulating devices for wireless installations." S. L. Forbes. July 19th.
19,850. "Dynamo electric machines." Sir C. A. Parsons and J. Rosen. July 19th.
19,861. "Stator-fed alternating-current machines." Siemens Schuckertwerke. July 19th. (Germany, February 21st.)
19,868. "Electric power transmission systems." A. M. Taylor. July 20th.
19,907. "Automatic telephone systems, &c." W. D. Edwards and Relay Automatic Telephone Co., Ltd. July 20th.
19,914. "Coin, &c., freed wireless apparatus." E. C. Ash. July 20th.
19,916. "Electric advertising, &c., apparatus." A. E. Foxler and S. G. Higgins and C. T. Marks. July 20th.
19,919. "Electric lamps for kinematographic apparatus." Pathé Cinema Anciens Etablissements Pathé Frères. July 20th. (France, December 5th, 1921.)
19,925. "Electric water heater." Electric Fires, Ltd., and F. L. Newhouse and C. H. Smith. July 20th.
19,943. "Electrically-illuminated signs." General Electric Co., Ltd., and W. C. C. Hawtayne. July 20th.
19,944. "Adjusting mechanism for electric lamps." F. H. Morris. July 20th.
19,947. "Electric lamp bulb magazines for motor vehicles." W. H. Eggington and O. Lucas. July 20th.
19,952. "Apparatus for repeatedly closing automatic switches." Akt. Ges. Brown, Boveri et Cie. July 20th. (Switzerland, September 10th, 1921.)
19,956. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd. July 20th. (United States, September 10th, 1921.)
19,958. "Telegraph transmitting apparatus." Western Union Telegraph Co. July 20th. (United States, May 13th.)
19,963. "Wireless receiving systems." A. J. Hall. July 20th.
19,965. "Feed mechanism for strip charts, &c., for tramcars, &c." E. H. H. Gordon and E. W. Lewis. July 20th.
19,975. "Electrical heating means for evaporating fuel for internal-combustion engines." W. M. Harrison. July 20th.
19,977. "Servomotors." P. Salmon. July 20th.
19,979. "Electric primary batteries." M. I. David and E. E. Dutt. July 20th.
19,983. "Electric heating apparatus." Electric Heating and Hardware, Ltd., and F. J. Wineberg. July 21st.
19,984. "Electric immersion elements for kettles, &c." Electric Heating and Hardware, Ltd., and F. J. Wineberg. July 21st.
19,989. "Automatic means for limiting electric current intensity in continuous current circuits." V. Stobie. July 21st.
20,005. "Crystal detector for wireless signals." G. F. Hines. July 21st.
20,020. "Device for automatically maintaining direction of current in external circuit of a direct-current generator constant." P. V. Powell and P. Frost Smith. July 21st.
20,022. "Detector galvanometer." E. E. Moore. July 21st.
20,029. "Electric storage batteries." M. I. David and E. E. Dutt. July 21st.
20,033. "Electro-magnetic alternating-current rectifiers." E. W. Kitchin. July 21st.
20,034. "Apparatus for electrical transmission and reproduction of music, &c., in conjunction with kinematograph pictures, or separately." G. R. Judge and R. A. Storey. July 21st.
20,036. "Ventilating systems for dynamo-electric machinery." J. A. Kuyser and Metropolitan-Vickers Electrical Co., Ltd. July 21st.
20,039. "Telephone exchange systems." Coventry Automatic Telephones, Ltd. (R. C. Arter and F. R. McBerty). July 21st.
20,040. "Multiple range current transformer." Landis and Gyr Akt. Ges. July 21st. (Switzerland, July 22nd, 1921.)
20,062. "Automatic regulation of output of electric installation." M. Doloukhanoff. July 21st.
20,064. "Braking apparatus for electrically-propelled vehicles." C. J. Spencer. July 21st.
20,075. "Variable electric resistances, wireless tuning apparatus." A. T. Scott. July 22nd.
20,079. "Electric switches." A. G. Davies. July 22nd.
20,116. "Electric irons." H. Stansfield Dodd. July 22nd.
20,121. "Burglar alarm." W. S. Edwards. July 22nd.
20,123. "Alternating current protective apparatus." British Thomson-Houston Co., Ltd. (A. S. FitzGerald). July 22nd.
20,125. "Electric resistances." Metropolitan-Vickers Electrical Co., Ltd., N. E. North. July 22nd.
20,126. "Electrical measuring instruments." Metropolitan-Vickers Electrical Co., Ltd. (Westinghouse Electric and Manufacturing Co.). July 22nd
20,127. "Methods of controlling electric currents and potentials in wireless signalling, &c." Radio Communication Co., Ltd., and J. Scott Taggart and P. D. Tyers. July 22nd.
20,139. "Tidal-wave power stations." K. Cornehl and W. Schwarzenauer. July 22nd. (Germany, July 26th, 1921.)

PUBLISHED SPECIFICATIONS.

The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1920.

36,450. "Microphones." J. Gardner. December 30th, 1920. (182,494.)

1921.

358. "Headlights for vehicles." J. M. Richardson. October 6th, 1913. (156,485.)
424. "X-ray photography." N. E. Luboshez. January 5th, 1921. (182,496.)
1,596. "Method of and means for regulating an electric central station and sub-station." R. Bosselmann. September 15th, 1919. (157,865.)
4,118. "Tanks for electrical transformers." O. Y. Imray (legal representative of O. Imray, deceased) (Pittsburgh Transformer Co.). February 3rd, 1921. (182,506.)
6,769. "Insulation of electric cables." C. J. Beaver and E. A. Claremont. March 1st, 1921. (182,510.)
7,052. "Electric fuses." H. J. Fuller. March 4th, 1921. (182,512.)
7,333. "Thermionic valves particularly applicable to wireless signalling." H. St. J. de A. Donisthorpe. March 7th, 1921. (Cognate application 14,052/21.) (182,516.)
9,518. "Automatic and semi-automatic telephone systems." Relay Automatic Telephone Co., Ltd., and W. D. Edwards. March 30th, 1921. (182,533.)
9,522. "Electric motor controllers." L. Satchwell. March 30th, 1921. (Cognate application 2,785/22.) (182,534.)
9,553. "Reciprocating electric motors and percussive tools embodying such motors." A. Bettica, G. Mazza and A. Macchioni. March 31st, 1921. (182,535.)
9,597. "Dry cell, particularly adapted for use with electric pocket lamps." J. Szorpik. March 31st, 1921 (Convention date not granted.) (160,828.)
9,664. "Call recording device for telephone instruments." R. B. Dunlop. April 1st, 1921. (182,542.)
9,732. "Process for simultaneously recording and simultaneously reproducing optical images and sound waves." E. Reisz. September 23rd, 1920. (Addition to 157,985.) (169,425.)
9,763. "Switches of the quick make and break type." J. B. Tucker. April 2nd, 1921. (182,553.)
9,825. "Electrically-operated bells or like signalling instruments." Sykes Interlocking Signal Co., Ltd., W. R. Henderson, J. H. Tiddeman, E. S. and F. V. Russell. April 2nd, 1921. (182,558.)
9,882. "Wind-driven electric generating sets." G. Lambert. April 4th, 1921. (182,559.)
10,168. "Electro-fining glass furnace." W. G. Clark. April 6th, 1920. (161,192.)
10,705. "Trolley pole safety appliance for electric trams and the like." P. M. de C. Ireland. April 12th, 1921. (182,584.)
10,776. "Chronometric electric switches and like control devices." C. J. Stewart, W. W. Stainer and L. Burn. April 13th, 1921. (182,586.)
11,131. "Quick make and break electrical switches." F. Shergold and Edison Swan Electric Co., Ltd. April 16th, 1921. (182,591.)
11,182. "Combined electric fuses or safety devices and insulators." I. Valen. April 16th, 1920. (161,956.)
11,323. "Electrically actuated mechanism for producing sliding or rotary motion." E. N. Bray. April 19th, 1921. (182,592.)
11,460. "Electric train lighting apparatus." W. A. Pitt. April 20th, 1921. (182,595.)
11,516. "Automatic cut-out or switch for electrically-heated apparatus." H. Jaggi Zumbuhl. April 21st, 1921. (182,596.)
11,668. "Sparking plugs." T. J. Puplett. April 22nd, 1921. (182,599.)
11,844. "Contactor controllers for electrical purposes." R. F. Baerlocher. April 25th, 1921. (182,602.)
12,125. "Electric lighters for cigars and the like." A. Zecchini. April 27th, 1921. (Addition to 162,296.) (182,608.)
12,469. "Electric switches." R. W. Bill and H. Heath. May 2nd, 1921. (182,614.)
12,470. "Auxiliary electric light for use with acetylene lamps and the like as used on motor propelled vehicles." W. H. Date. May 2nd, 1921. (182,615.)
12,638. "Cable attaching device particularly applicable to the fixing of electric cables to carbon brushes." E. Gindre. May 3rd, 1921. (182,619.)
12,810. "Manufacture of metal tubes by electrolytic deposition." M. A. Jullien. May 4th, 1921. (182,623.)
13,391. "Current distributors of electric ignition systems." J. H. Runbaken. May 11th, 1921. (182,639.)
13,866. "Electric locomotives." R. L. Stanbrook and W. S. Mundle. May 17th, 1921. (182,633.)
14,673. "Arrangements for diminishing magnetic dispersion in electric transformers." Akt. Ges. Brown, Boveri et Cie. June 2nd, 1920. (164,017.)
15,737. "Power plants." British Thomson-Houston Co., Ltd. (General Electric Co.). June 7th, 1921. (182,655.)
15,823. "Electrical insulators." Metropolitan-Vickers Electrical Co., Ltd. July 7th, 1920. (166,113.)
15,911. "Electromagnetic chucking devices." F. Krupp Akt. Ges. July 26th, 1920. (Addition to 147,590.) (167,153.)
16,388. "Telephone systems." L. Drouet and A. Thomas. June 16th, 1920. (164,754.)
16,494. "Electric condensers." R. E. J. Varret. April 11th, 1921. (178,397.)
16,532. "Telephone systems." L. Drouet and A. Thomas. June 17th, 1920. (Addition to 164,754.) (165,036.)
16,840. "Loud-speaking devices for wireless receiving sets, telephones, telegraphs, and the like." J. W. Greenwood. June 20th, 1921. (182,671.)
17,506. "Arrangement and construction of electrodes in apparatus for electrolizing fused materials." T. Kolkin. June 27th, 1921. (182,679.)
17,525. "Electric switches." G. V. Twiss. June 27th, 1921. (182,680.)
18,847. "Electrically-controlled fluid pressure actuated motors for operating doors, gates, and other like members." F. B. Dehn (National Pneumatic Co.). July 12th, 1921. (182,690.)
19,474. "Methods of manufacturing bodies of tungsten alloys." British Thomson-Houston Co., Ltd. (General Electric Co.). July 19th, 1921. (182,699.)
20,280. "Electric switches." H. Lucas, O. Lucas and W. C. Turner. July 28th, 1921. (182,706.)
26,475. "Wireless telegraphy." H. Abraham. October 6th, 1920. (169,907.)

1922.

1,253. "Electric induction furnaces." O. Frick. January 15th, 1921. (174,084.)
4,602. "Closed circuit magnetic switches." Siemens & Halske Akt. Ges. March 3rd, 1921. (176,342.)
7,471. "Electric circuit interrupters." Metropolitan-Vickers Electrical Co., Ltd. March 14th, 1921. (177,159.)

Meters for River Gauging.—The Department of Scientific and Industrial Research has issued a treatise on current meters for use in river gauging, by Mr. A. Hogan, Ph.D., F.I.C. (H.M. Stationery Office. Price 1s. 6d. net). In view of the proposals for developing the power of rivers and streams for electrical purposes the appearance of this work is very opportune. The various methods which may be employed for registering the discharge of rivers, *e.g.*, the chemical, velocity area, and float methods, are reviewed, and the principles of the current meter are described. The conditions affecting the use of current meters are considered; a number of types are illustrated and described in detail, and the special advantages or drawbacks of each are given attention. The meters thus described include the Price, the Amsler, the Ott, the Stoppani, and others. A series of comparative tests carried out at Massena (New York) forms the subject of a chapter.

After Eight Years.—Eight years ago to-day—August 4th, 1914—is with us all a day of remembrance, for it was the day on which the Call to Arms went forth to all classes of the manhood of the British Empire. Though it is 3¼ years since the Armistice was signed we are still deeply involved in the problems that the world war has left behind. Field-Marshal Haig, as president of the British Legion, has chosen this anniversary to issue a further appeal on behalf of the scores of thousands of deserving cases of distress amongst ex-Service men and the dependents of fallen comrades which Government provision does not touch. We recently urged our readers to support the fund, and we desire now to repeat our appeal to them to fulfil the solemn duty of remembrance that rests upon them by sending contributions to Field-Marshal Haig, care of Sir Herbert Brown, K.B.E., British Legion Appeals Office, 1, Regent Street, London, S.W.1.